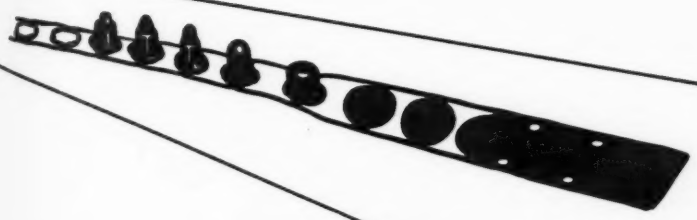


Annual Pressworking Issue

CTOBER 1959

TOOLING & PRODUCTION Magazine

Talk of the Month: Europe's Challenge to American Ingenuity . . . 26
by A. Lightfoot Walker

Time Saving Tool Reams and Chamfers . . . 47

Eight-Station Unit for 19 Operations 51

Punch Design Ups Output and Quality . . . 76

Cam-Indexed Roll Feed Ups Output 50% 89

Standard Drill Heads Do Tricky Machining . . . 93

One Press Brake Does Work of Three . . . 95

Rotary Machine Handles Three Intake Manifolds . . 95

Work Drivers Boost Lathe Production 96

Speedy Nut Tapper Is Fully Automatic 96

Missile Part Accurately Turned . 98

One Control Works Hydraulic Clamps 98

Departments In This Issue:
Personally Speaking . . . 4
Men You Should Know . . 19
Manufacturing Memos . . 80
New Calling Cards . . . 86
Book Reviews 97
Catalogs — and other helpful literature . . . 100
Product News 112
Cumulative Editorial Index . 148

An Editor's Tribute to The Die Designer-Maker 41
Editorial by E. Willard Pennington

Caught Short for a Die? Build It Backwards . . . if you must 43
by William E. Hoffman

Transfer Machine Uses New Methods for Unusual Part Design 46

Vacuum Process for Die-Block Steel 48

Stainless Steel Sheets Become Water Softener Tanks by Shearing, Punching, Rolling, Welding, and Polishing 49

Powdered Metal Bonds Carbide to Steel 52

Flame Hardened Dies 53
by Stewart M. DePoy

Rotary Swaging—First of a Series 56
by Keith Bernhardt

Color Coding Dies for Safety 58
by William J. Kirsch

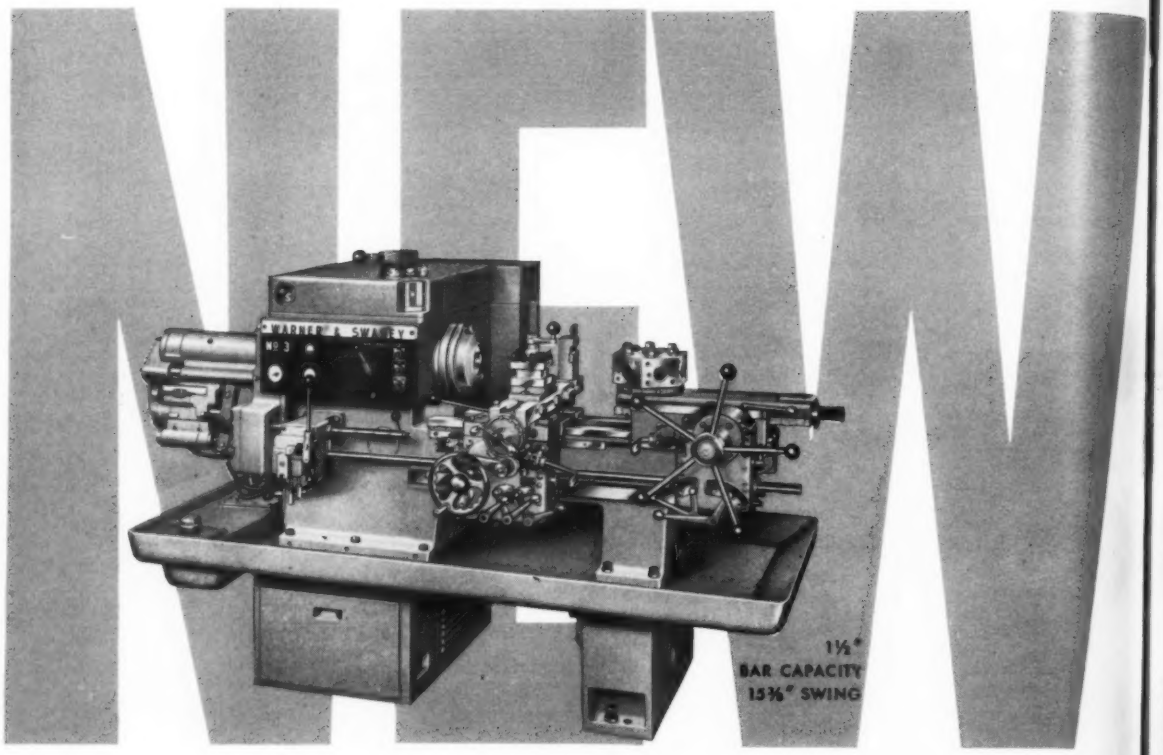
ID's by Squeeze 63

Plastic Tooling Cuts Drawing Costs 64

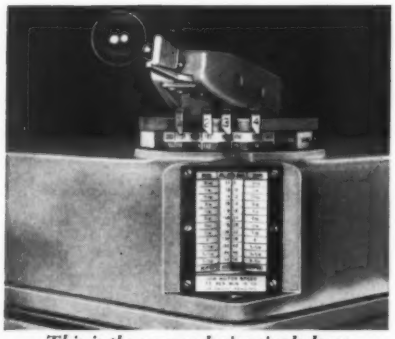
Hydraulic Press-Welding Method Improves Production of Motor Lamination Stacks 68
by Warren C. L. Fricke

Modifications for Forming PH Steels 72
by C. T. Olofson

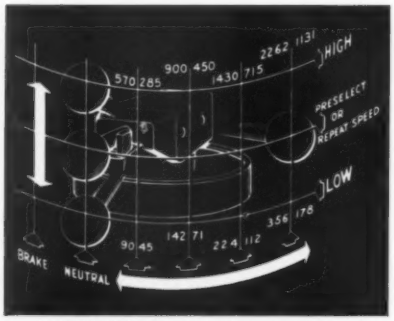
When Do You Make or Buy Tooling? 74
by Gerald Grant



WARNER & SWASEY No. 3 ram type turret lathe



This is the new exclusive single lever headstock control...



This is how easy it is to operate

Unique, Automatic Headstock

More Speeds—Greater Range—The new eight-speed headstock (16 with a two-speed motor) gives you more speeds in a wider range—from 45 to 2262 rpm—for maximum metal removal efficiency.

Instant Speed Changes are made possible through exclusive, Warner & Swasey designed direct-acting hydraulic clutches (which never need adjustment) in combination with a constant mesh, helical gear train.

Full Power is always available at the spindle nose. Higher-powered motor is direct-mounted to eliminate drive maintenance problems.

Exclusive, Single Lever Preselector and Speed Control

On the new No. 3, preselection of speeds, speed change, brake and neutral are all obtained with the same lever.

No fumbling for speeds...no gear shifting. Just rotate the handle to preselect; move it up or down to engage new speed instantly.

No figuring...the direct reading preselector dial tells you the surface speed for each diameter and rpm.

No remembering (or forgetting)...the preselector drum lets you set up the sequence of cuts; numbered clips tell you where to find the speeds and their order of use.

Neutral (free spindle) and Brake are selected by rotating lever to the left.

Warner & Swasey Co.
Cleveland 3, Ohio

You can produce it better, faster, for less...with a WARNER & SWASEY

CIRCLE INFORM-A-GRAM KEY NO. 2

HARDINGE
ELMIRA, N.Y.

High Speed Precision

MILLING MACHINES

The RIGHT Size For Work Too Small for Heavy Duty Millers.

- 1⅛" Collet Capacity Dividing Head and Cutter Spindles
- Table Size 25" x 6½"
- Eight Spindle Speeds — 110 to 1850 R.P.M.
- Plain or Universal

Write for Bulletin TM-UM

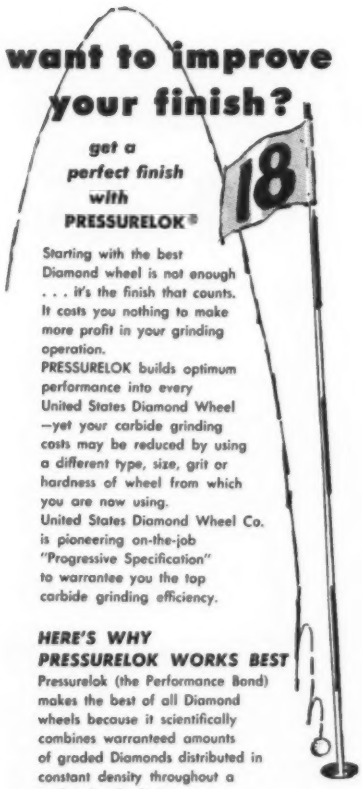
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

Offices in principal cities: Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Seattle, Portland, Minneapolis, Oakland, St. Louis, Toronto. Export Office: 269 Lafayette St., New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 3

want to improve your finish?

get a perfect finish with **PRESSURELOK®**



Starting with the best Diamond wheel is not enough . . . it's the finish that counts. It costs you nothing to make more profit in your grinding operation.
PRESSURELOK builds optimum performance into every United States Diamond Wheel —yet your carbide grinding costs may be reduced by using a different type, size, grit or hardness of wheel from which you are now using.
United States Diamond Wheel Co. is pioneering on-the-job "Progressive Specification" to warrantee you the top carbide grinding efficiency.

HERE'S WHY PRESSURELOK WORKS BEST
Pressurelok (the Performance Bond) makes the best of all Diamond wheels because it scientifically combines warranteed amounts of graded Diamonds distributed in constant density throughout a perfect bond which wears uniformally at the ideal rate of Diamond usage.

be SURE. . . get PRESSURELOK®

THE PERFORMANCE BOND

This wheel is a precise duplication of your specification, warranteed when properly operated, to give you the lowest cost per cut of any wheel.

Write for our catalog No. 957 or call us at Aurora (Illinois) 7-9181 for "Progressive Specifications" on your job without any obligation on your part.

US UNITED STATES DIAMOND WHEEL CO.

835 ILLINOIS AVENUE AURORA, ILLINOIS
CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

OCTOBER 1959
VOL. XXV No. 7
GEORGE J. HUEBNER, Founder
1885 - 1956

PERSONALLY SPEAKING

Dear T & P Reader:

Legitimate foreign trade is essential to the peace and wellbeing of the world. The United States as a dominant member of the free world community must participate in both phases of trade—importing as well as exporting.

But the United States and you and I and all other Americans must stop destructive foreign competition. I'm talking about goods that come into the U.S. which were produced by twenty cent per hour labor and other goods coming from behind the Iron Curtain priced without regard for cost of manufacturing. Such goods, if imported in volume, could destroy jobs faster than we can create new ones.

This whole subject of destructive foreign competition is very ably but concisely presented in an article which appeared recently in Bausch & Lomb Optical Company's publication, THE EDUCATIONAL FOCUS, under the title "What Price Do We Pay for Imports?" It is too long to publish in this limited space but reprints are available. I recommend it to you as "must" reading.

For a free copy write Editor, "The Educational Focus," Bausch & Lomb Optical Co., Rochester 2, N. Y., asking for reprint #L-298, or if it is more convenient for you, circle No. A-1 on the Inform-A-Gram Card and we will forward your request.

Cordially yours,

Ray Huebner

Publisher

READERSHIP RESEARCH — BPA

Business Staff:
R. L. Huebner, Publisher

P. E. Hager, Production Manager
E. J. Brooks, Art Director
B. C. Jackson, Research Manager
Mary Yoshida, Contract Manager
Roger C. Mills, Circulation Manager

Editorial Staff:
E. Willard Pennington, Editor
Carol E. Reuss, Managing Editor

William E. Hoffman, Associate Editor
Charles Weiner, Assistant Editor
Jeannette T. Wyckoff, Assistant Editor
Carl F. Benner, Contributing Editor
Ernest J. Urbas, Contributing Editor
Nyles V. Reinfeld, Contributing Editor

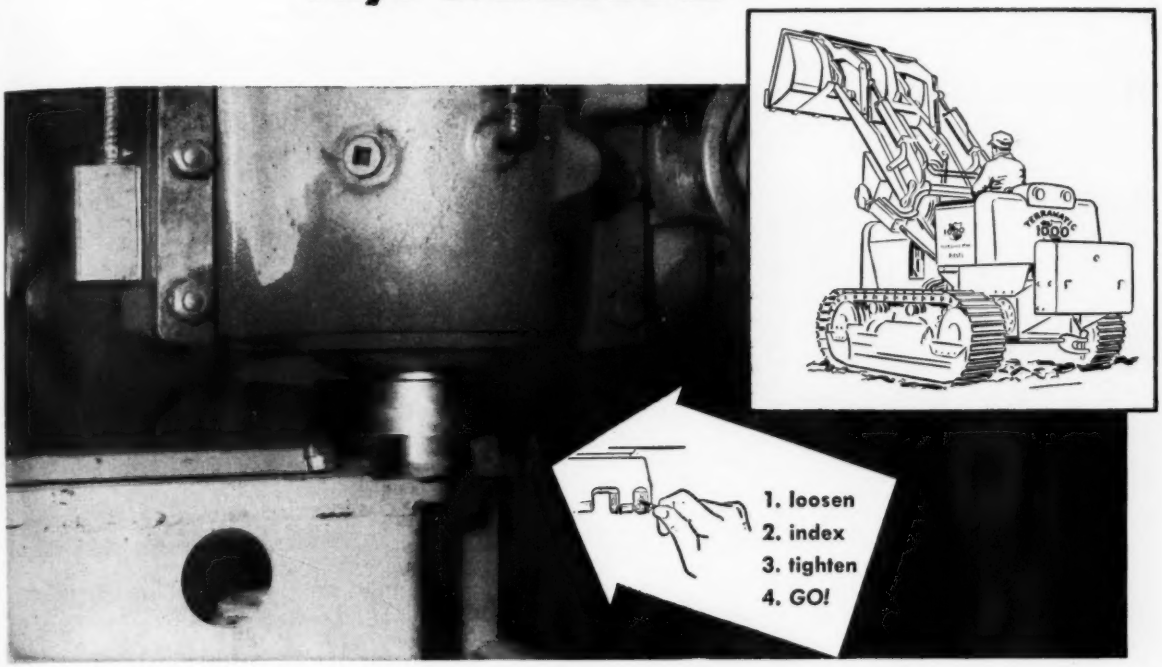
Editorial and Business Offices: 1975 Lee Road, Cleveland 18, Ohio, FAirmount 1-4040
Printing Office Address: P.O. Box 1494, Louisville, Ky. (For Plate Shipments Only)

Published Monthly by HUEBNER PUBLICATIONS, INC.

R. R. HUEBNER.....Chairman, Secretary, Treasurer
RAY L. HUEBNER.....President GEORGE J. HUEBNER, JR.....Vice President

Copyright by Huebner Publications, Inc., 1959. Accepted as Controlled Circulation Publication at Shepherdsville, Ky. Single copies $1.00 each. U. S. subscription rate $2.00 per year for metalworking plant operating executives and department heads. All other subscriptions $6.50 per year. All foreign subscriptions, $10.00 per year.

V-R Milling Cutters are dependable says J.I.CASE



16 months of continuous milling on TERRAMATIC transmission housings

It's no "pink tea party" when you chew a quarter-inch of rough 1015 Weldment Steel casting — spinning the milling cutter at 800 s.f.p.m. That milling cutter's got to be tough — *plenty tough* — and the carbide inserts need real "backbone."

J. I. Case found the right combination in V-R Face Mill Cutters with V-R throw-away carbide inserts. Big demand for Case Terratrac dozers, diggers, and crawlers, with Terramatic Transmission, has kept production lines humming — 2 and 3 shifts a day — 16 months continuous production. In this picture there's no place for excessive downtime, or delays for tool regrinding. V-R Face Mill Cutters provide cutting edges right on the job — a turn of a wrench — index the insert to a new cutting edge — tighten — and away you go! (Minimum maintenance problems, too: in *16 months production only 3 sets of main screws and 1 chip breaker plate needed replacing.*)

Your V-R representative has the facts on Face Mill Cutters and all carbide cutting tools — call him in today or send for Catalog VR-58.

V-R Vascoloy-Ramet corporation

PRIME MANUFACTURERS OF REFRACTORY METALS ENGINEERED FOR THE JOB

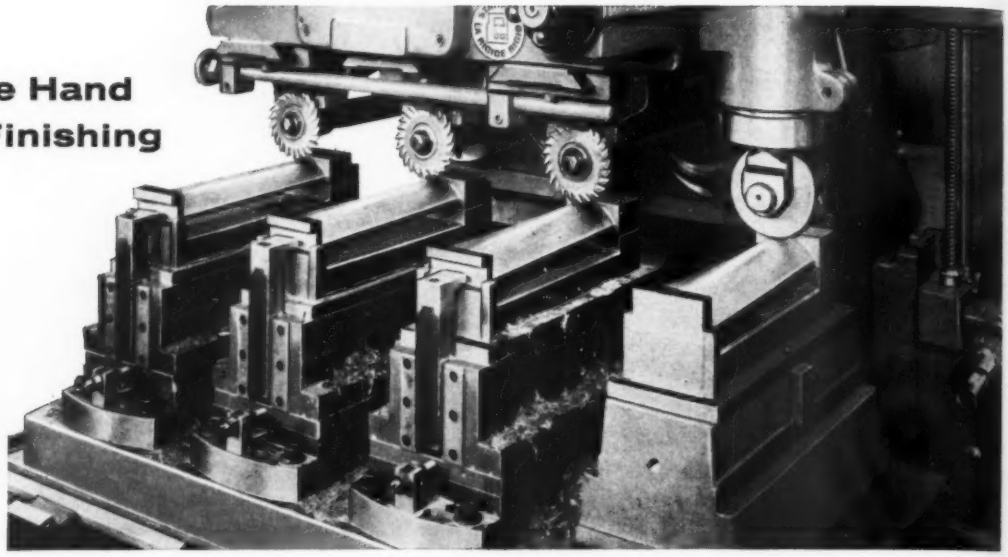
FM-734

826 Market Street • Waukegan, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 5

Mill Turbine Blades Faster With Finer Surface Finish On A Rigid ST-100

Reduce Hand Finishing



3-spindle Rigid ST-100 finish milling turbine blades.

This new Rigid ST-100 Automatic Blade Miller will cut production costs and improve the quality of your turbine blade milling at the same time. Rigid's new and greatly improved milling method produces an extremely fine finish in less time on jet engine and gas and steam turbine blades up to 16″ blade section length.

COMPARE THESE RIGID FEATURES

Automatic Cycle Control — fool-proof, single lever control permits operation by unskilled hands, takes less operator time—provides automatic switch-over from pendulum milling along the shroud to fast sweep-milling along the blade length.

High Working Accuracy — to ±.002″ provides fine surface finish—keeps necessary allowance for hand finishing time to a minimum. Milled blades often require only little polishing.

Rigid ST-100 Automatic Hydrocopy Turbine Blade Milling Machine.

High Production—Sweep milling feeds up to 40 in./min. Feed rate remains constant over profile angles up to 80°. Extremely heavy cuts are possible.

No Blade Deflection—thin blades are nested to eliminate deflection and vibration during machining.

Hydraulic Clamping—by universal clamps holds pieces rigidly for heavy roughing.

Other Features—16 spindle speeds from 24-420 rpm • spindle-drive by 10-12 H.P. motor • supplied as 3-spindle machine (2 spindles optional) • additional transverse copying device and vertical spindle attachment permitting 3-dimensional machining of blades with complex shrouds.

Write for more information.

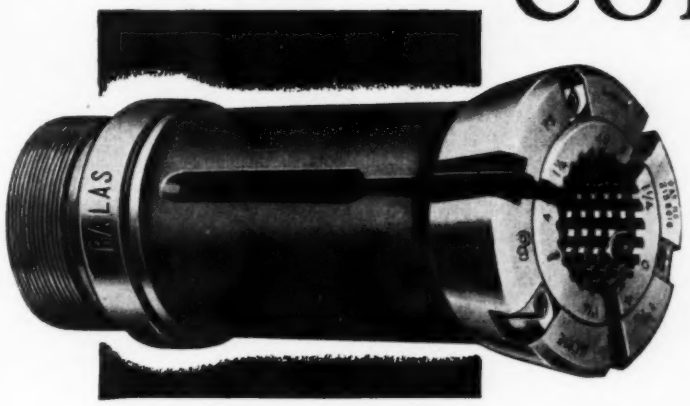
COSA — *nationwide sales and service of precision machine tools—from bench lathes to boring mills.*

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IN CANADA contact COSA CORPORATION OF CANADA, LTD., 160 Lakeshore Road, Long Branch, Toronto 14, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 6

DURABLE
VERSATILE
ECONOMICAL
BALAS
MASTER COLLETS



You can always depend on Balas Martin Master Collets even when working under the roughest, toughest conditions. They are expertly engineered and ruggedly built to last for years.

Balas Master Collets and assorted sets of pads enable you to make use of the full capacity of your automatics. The pads are front loading to save hours of set-up time.

Precision made Balas Master Collets not only provide extraordinary service but we guarantee that they must satisfy you.

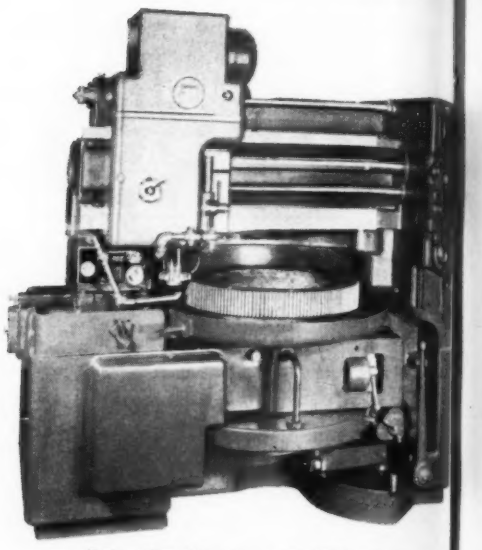
Collets and pushers in popular sizes for most machines are carried in stock for immediate delivery. Write for price list and catalog.

YOU NEVER HELD IT SO GOOD!

BALAS COLLET MANUFACTURING CO.

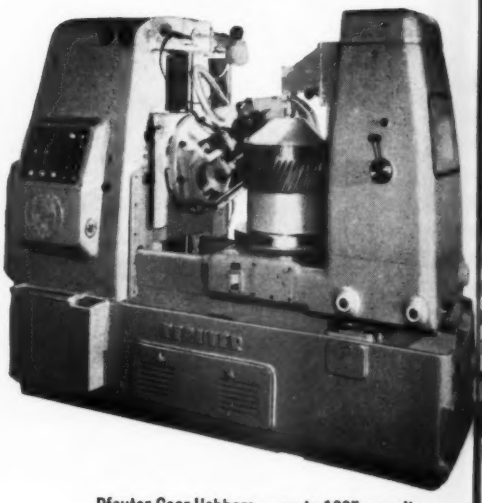
CLEVELAND 14, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 7



Fellows Gear Shapers... up to 120" capacity

SHAPE IT, HOB IT, OR GRIND IT! ONLY FELLOWS OFFERS ALL 3 MACHINES!



Pfauter Gear Hobbers... up to 120" capacity

No. 12 Fellows-Reishauer Gear Grinder... up to 12" capacity

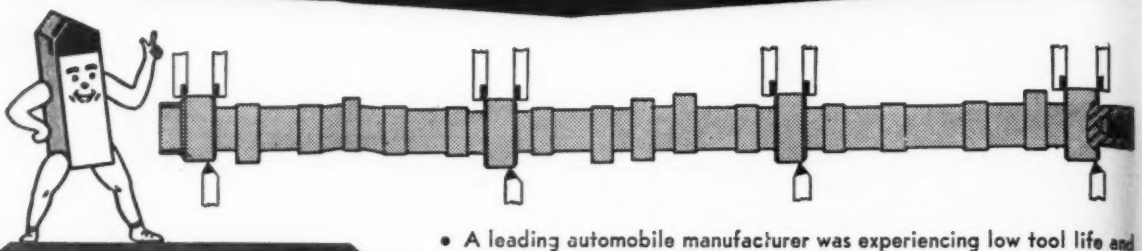
WHATEVER YOU NEED for modern gear productivity, Fellows has the equipment to keep you in the competition! In addition to Gear Shapers, and all other Fellows equipment from cutters to inspection instruments, Fellows now sells the No. 12 Fellows-Reishauer Gear Grinding Machine and the complete line of world-famous Pfauter Gear Hobbers! Fellows Gear Shapers and Pfauter Gear Hobbers provide outstanding accuracy and high production speeds, on short runs as well as long runs, for a wide range of gears up to 120" P.D. On all but the larger units, a wide range of attachments is available for semi-automatic or fully automatic operation. Runout tolerances measured in tenths, produced at production line speeds, are the special province of the No. 12 Fellows-Reishauer Gear Grinding Machine. Simple, fast set-up permits economical grinding of single gears as well as long runs in sizes up to 12" O.D. Ask your Fellows Representative about the complete line of gear production and inspection equipment. Just write or call any office of The Fellows Gear Shaper Company, 78 River Street, Springfield, Vermont. Branch Offices: 1048 N. Woodward Ave., Royal Oak, Michigan.; 150 W. Pleasant Ave., Maywood, New Jersey; 5835 W. North Ave., Chicago 39, Illinois; 6214 W. Manchester Ave., Los Angeles 45, California.

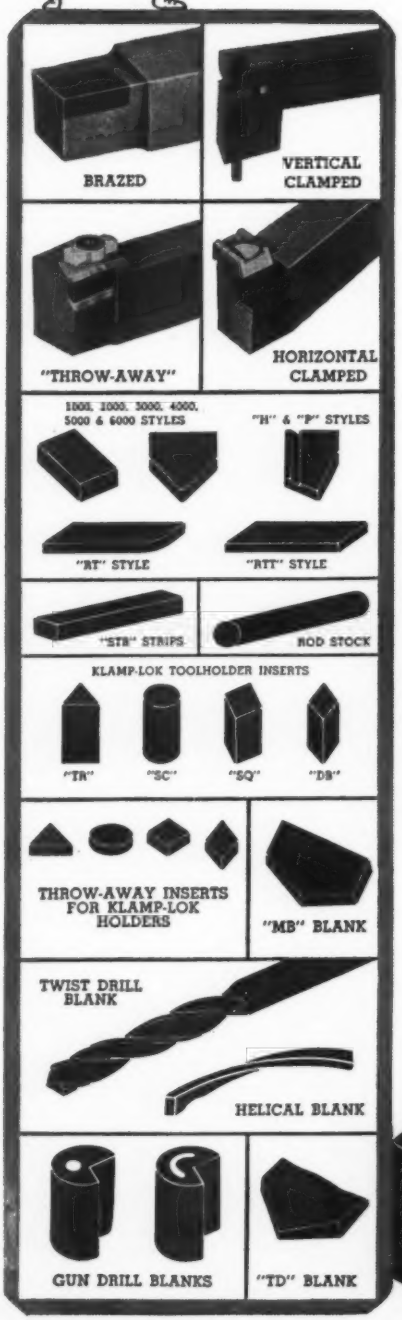
FELLOWS GEAR PRODUCTION EQUIPMENT

THE PRECISION LINE

CIRCLE INFORM-A-GRAM KEY NO. 9

1020 CAMSHAFTS MACHINED WITH Talide® C-91!





• A leading automobile manufacturer was experiencing low tool life and high costs machining camshafts made of tough, highly abrasive cast iron alloy. Talide tool engineers installed Grade C-91 with the following superior results:

GRADE C-91 CASE HISTORY

Parts.....Automobile camshaft

Material...Cast Iron Alloy 1.8165 dia. x 23-½" long, 260 Brinell

Operation..Rough turning 4 bearing surfaces

Machine...Sundstrand Model #8 automatic

Tools.....4 Talide TB-123-⅜" I.C. x 1½" long triangular inserts, Grade C-91, mounted in Klamp-Lok toolholders

Depth of Cut 1/16" to 3/32"

Feed.....012

Speed.....130 (S.F.M.) 274 (R.P.M.)

Coolant....Soluble Oil

Results....Talide Grade C-91 machined 1020 camshafts per grind compared to 550 for 2nd best competitive grade and 275 for 3rd best. Special attention to the grind and chip breaker detail resulted in Grade C-91 outperforming all other grades used previously.

QUALITY CONTROL GUARANTEES TOP TOOL PERFORMANCE...

Determining rupture strength of test bar. Hardness is determined on Rockwell machine, center.

Leco and Burrell instruments are employed in the analysis of metal oxides.

• A constant research program at Metal Carbides pays off in improved Talide grades having extra high hardness, strength, rupture resistance and crater resistance properties. Processed in latest type vacuum electric furnaces—all Talide grades are uniform and consistent in quality.

Write for Catalog 56-G

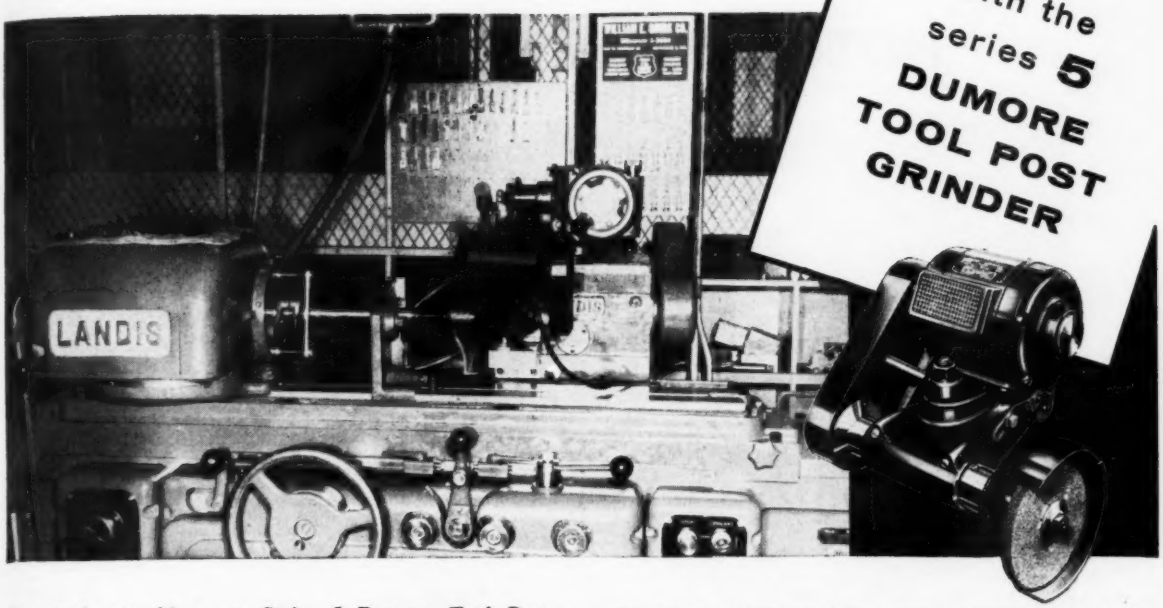
METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

Metal Carbides Corporation Youngstown 12, Ohio

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 10

Add Broader Range, Lower Cost INTERNAL GRINDING Capacity to Your Plain or Universal Grinders...



By merely attaching two Series 5 Dumore Tool Post Grinders to the spindle housing on each of two standard grinding machines, a Midwestern manufacturer gained a far wider range of internal grinding capacity at much lower cost than other methods.

The first unit is attached to an old standard grinding machine by means of a simple, angle bracket. *Result:* a long-forgotten machine turned into a high production, precision internal grinder, saving the cost of purchasing a new machine. The second Series 5 unit is added to a brand new standard grinding machine by the same type bracket. *Result:* the company obtained the additional internal grinding capacity needed as well as the external grinding machine required, for less money!

Eleven quick-change quills with available speeds from 4600 to 42,500 rpm and wheel capacity from ⅛" on shallow work to 1⅞" at 18" deep . . . give the Series 5 its remarkably high versatility for hundreds of internal grinding jobs. What's more, the total cost for this equipment is a great deal less than for any other with comparable .0001" accuracy and surface finishes of 6 to 8 micro-inches.

The Series 5 Dumore Tool Post Grinder has a ½ hp distributed field, continuous duty rated universal motor and can handle wheels from ⅛" to 5". You can use it for *both* internal and external grinding operations. Simplified mounting permits you to shift it quickly from one job to the next, or from one machine to another.

MOUNTS ON ANY BASIC MACHINE TOOL . . . planers, shapers, mills, grinders and lathes with 13" to 18" swing . . . to provide precision grinding equipment at low cost. In addition, it can be easily adapted to special-purpose set-ups for special jobs. Eight other models available, 1/5 to 3 hp, for every size of basic machine and grinding job. Write for catalog.

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

You can do more grinding with Dumore Grinders on *any* machine tool

DUMORE

AUTOMATIC DRILL and TAP UNITS
PORTABLE MILLING UNITS
MICRO-DRILLS
TOOL POST and HAND GRINDERS

PRECISION TOOLS

THE DUMORE COMPANY, 1304 Seventeenth St., Racine, Wisconsin

DUMORE HAND GRINDERS

- JOB PROVED over 100,000 in use
- Built best, priced right

Lightweight, compact, balanced to minimize vibration, ample power. 5 models—1/20 to 1/4 hp . . . a grinder for every job.

DUMORE FLEX-SHAFT TOOLS

- QUALITY BUILT FOR LONG LIFE

Lightweight, cool-running hand pieces give sure grip, close control. For grinding, burring, filing, sanding, lapping, chamfering, etc. 5 models.

DUMORE PRECISION QUILLS

Machined from solid bar stock. Close tolerance operation control. Free-running spindles regardless of heat, speed or hours of use. Use with Dumore Grinders or—as heads in special set-ups, as replacement spindles or high speed attachments. 5 basic types.

FOR MORE INFORMATION ON THESE PRECISION TOOLS—WRITE FOR CATALOG

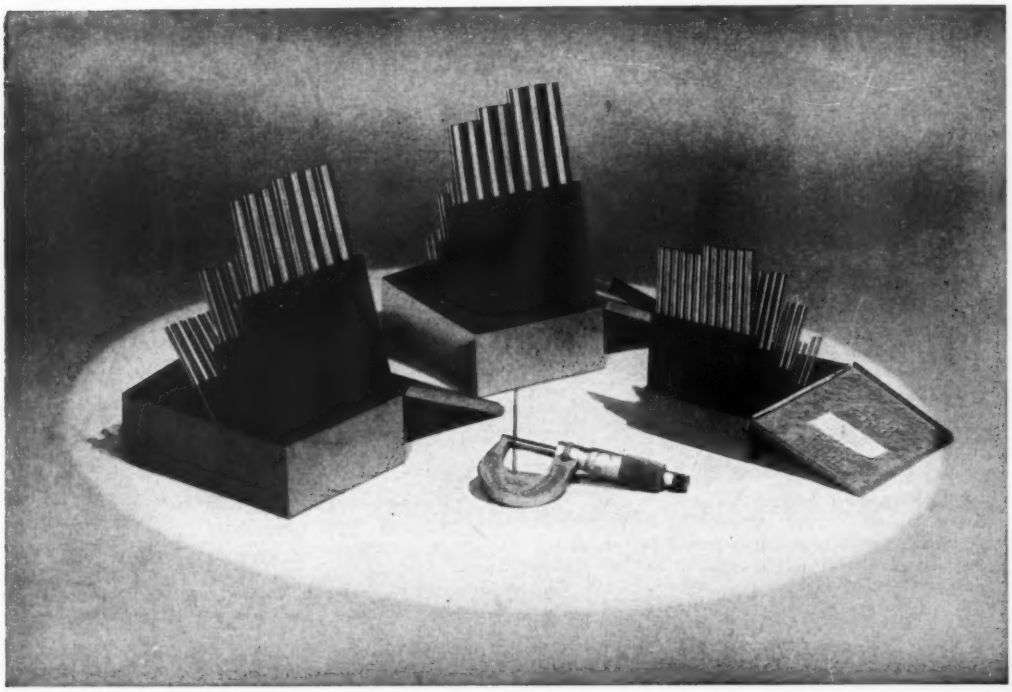
CIRCLE INFORM-A-GRAM KEY NO. 11

DRexel 6-4222 ESTABLISHED 1927

WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" – .0000
or
+ .0000 – .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

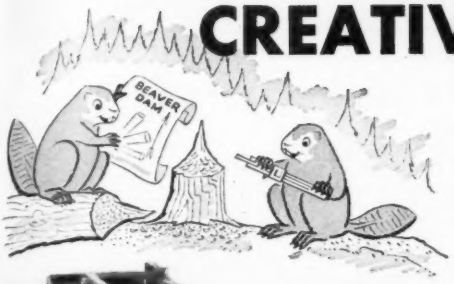
M2 — HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish — parallel ground.

ANY DECIMAL DIAMETER OF STANDARD LENGTH
.012" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 12

Carl:
This sounds like what we've been looking for. Suggest you investigate
JC

COOPERATIVE CREATIVE-ENGINEERING



• COOPERATION IN IDEAS

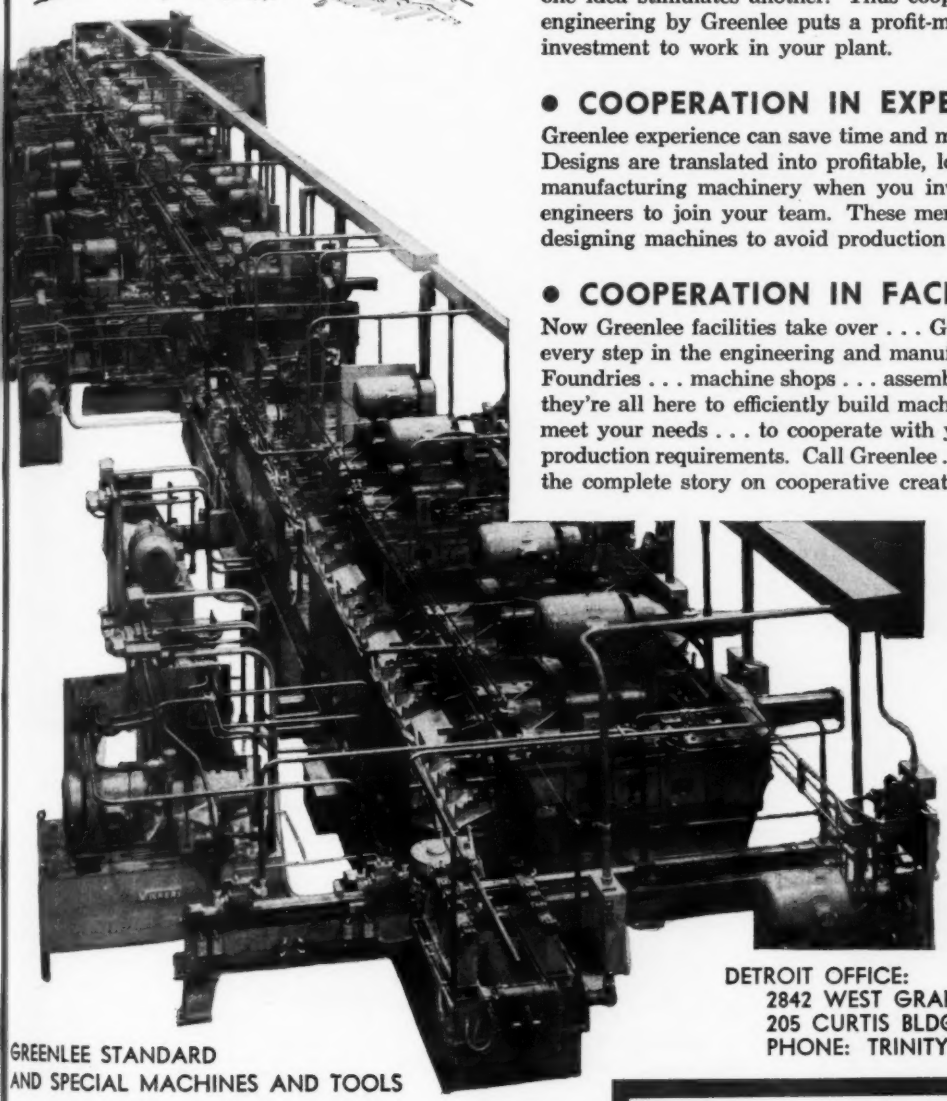
Greenlee engineers work with your men at all levels of management, production, and engineering. They gather and exchange information based on broad experience. These contacts accelerate creative thinking . . . one idea stimulates another. Thus cooperative creative-engineering by Greenlee puts a profit-making investment to work in your plant.

• COOPERATION IN EXPERIENCE

Greenlee experience can save time and money in your plant. Designs are translated into profitable, low-cost manufacturing machinery when you invite Greenlee engineers to join your team. These men know the art of designing machines to avoid production problems.

• COOPERATION IN FACILITIES

Now Greenlee facilities take over . . . Greenlee controls every step in the engineering and manufacture of machines. Foundries . . . machine shops . . . assembly floors . . . they're all here to efficiently build machines to meet your needs . . . to cooperate with you in meeting production requirements. Call Greenlee . . . let them give you the complete story on cooperative creative-engineering.



PRODUCTION MACHINERY
GREENLEE

Miss Jones:
write for available literature and mail this to Jo Thompson
CF

DETROIT OFFICE:
2842 WEST GRAND BLVD.
205 CURTIS BLDG.
PHONE: TRINITY 2-3938

GREENLEE STANDARD
AND SPECIAL MACHINES AND TOOLS

- Transfer-Type Processing Machines
- Multiple-Spindle Drilling and Tapping Machines
- Six and Four-Spindle Automatic Bar Machines
- Die Casting Machines and Trim Presses
- Hydro-Borer Precision Boring Units
- Core Box Handling Equipment for Foundries
- Specialized Woodworking Machines
- Hand Tools for Woodworking
- Tools for Woodworking Machines
- Hydraulic Tools for Electricians, Plumbers, Contractors

Machines designed with the future in mind

GREENLEE
BROS. & CO.
1747 MASON AVE.
ROCKFORD, ILLINOIS

Joe: These people have a lot of machines in the Detroit area — look them over and let me know your reaction. CF

Products of Precision by CADILLAC GAGE

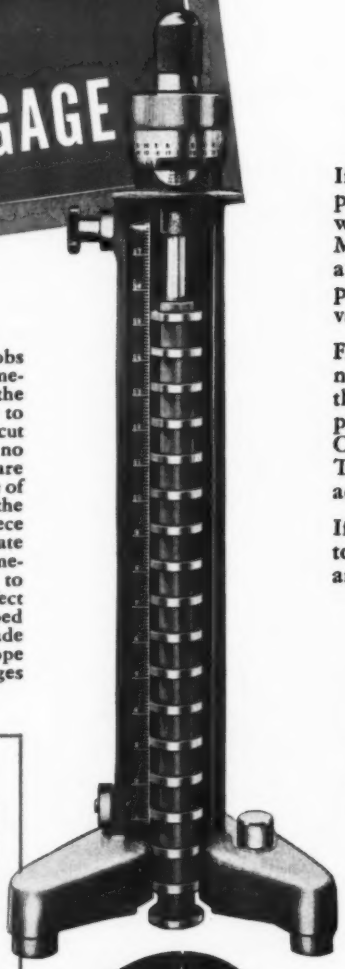
If it's precision you want—guaranteed precision—you've come to the right place when you specify Cadillac Gages and Measuring Instruments. For Cadillac is a name built over the years on accuracy, precision, quality, long instrument life, value and economy.

From the famous PLA-CHEK Gages, now proved in hundreds of plants throughout industry, through the complete line of Thread Ring, Thread Plug, Cylindrical Ring, Cylindrical Plug, Pipe Thread and Concentricity Gages, neither accuracy nor quality is ever sacrificed.

If your operations require really close tolerances, specify Cadillac Gages . . . and get guaranteed accuracy.

PLA-CHEK GAGES

In thousands of installations on innumerable jobs PLA-CHEK Gages are daily proving their time-saving and money-saving advantages, both at the surface plate and the machine. Extremely easy to operate—and fast, too,—PLA-CHEK Gages cut inspection time from minutes to seconds with no loss of accuracy. No auxiliary gage blocks are necessary. PLA-CHEK'S measuring bar is made of deep-frozen, strain-free alloy steel. Steps on the bar are exactly 1" apart. Because of its one-piece construction, steps cannot change or separate with age. Adjustment of the bar is by the micrometer thimble at top. Since it is not necessary to touch the measuring bar, body heat cannot affect it. All reference surfaces are ground and lapped to extremely close tolerances. Precision-made risers, which give PLA-CHEK even more scope and are engineered as accurately as the gages themselves, are available for all models.



COMPLETE RANGE OF SIZES

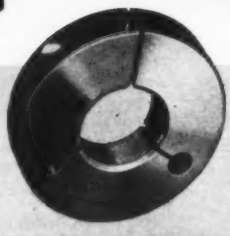
PLA-CHEK Gages are available in a full range of sizes to meet every inspection or surface plate layout requirement. Models are: The easily portable 6", 12" and 18" sizes, each guaranteed accurate throughout its entire range to .00005"; the 24" guaranteed to .0001" over its entire range; and the 36" and 48" sizes guaranteed accurate to .0001" in any 24" length or .0002" over their entire range.

CYLINDRICAL RING GAGES

Deep frozen for stability and long life, Cadillac Cylindrical Ring Gages reproduce assembly conditions exactly.

THREAD PLUG GAGES

Full length of gaging member is available for inspection. Worn or damaged end may be reversed in collet. Available in a full range of sizes.



THREAD RING GAGES

Manufactured of the finest alloy steel, these gages are heat and cold-treated for maximum stability. They are carefully lapped and closely inspected under controlled conditions.

CYLINDRICAL PLUG GAGES

Available in a full range of sizes, these cylindrical plug gages provide unconditionally guaranteed accuracy.

Cadillac GAGE COMPANY

P.O. BOX 3806 • DETROIT 5, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 14

NEW FROM **FAIR STREET** • HOME OF MICROBORE

titanium carbide and ceramic tipped microbore adjustable tooling!

Minimum overhang between cutting tip and cone seat assembly reduces deflection, assures extended tool life.

Cone relief has uniform clearance around profile of cutting edge for maximum tool life.

Cone Relief Ground Like All Microbore Tips!

High cutting speeds! Microbore titanium carbide and ceramic tips cut at speeds and feeds impossible with any other type tips, yielding excellent surface finish . . . in some instances comparable to ground finish. Micrometer vernier adjustment sets the tool point in seconds to accurate part dimensions. Extreme rigidity of basic design, double cone bearing and axial locking force; plus minimum tool point overhang, makes Microbore ideal for these new cutting edges. *Like all Microbore cutting tools, the new tips are cone relief ground to gage room accuracy.* Microbore titanium carbide and ceramic tipped tooling are major developments in the complete Microbore system of precision cutting tools.

Ask your Microbore distributor for complete information or write for Microbore catalog.

DeVlieg® Microbore® System

DEVLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

Fair Street • Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 15

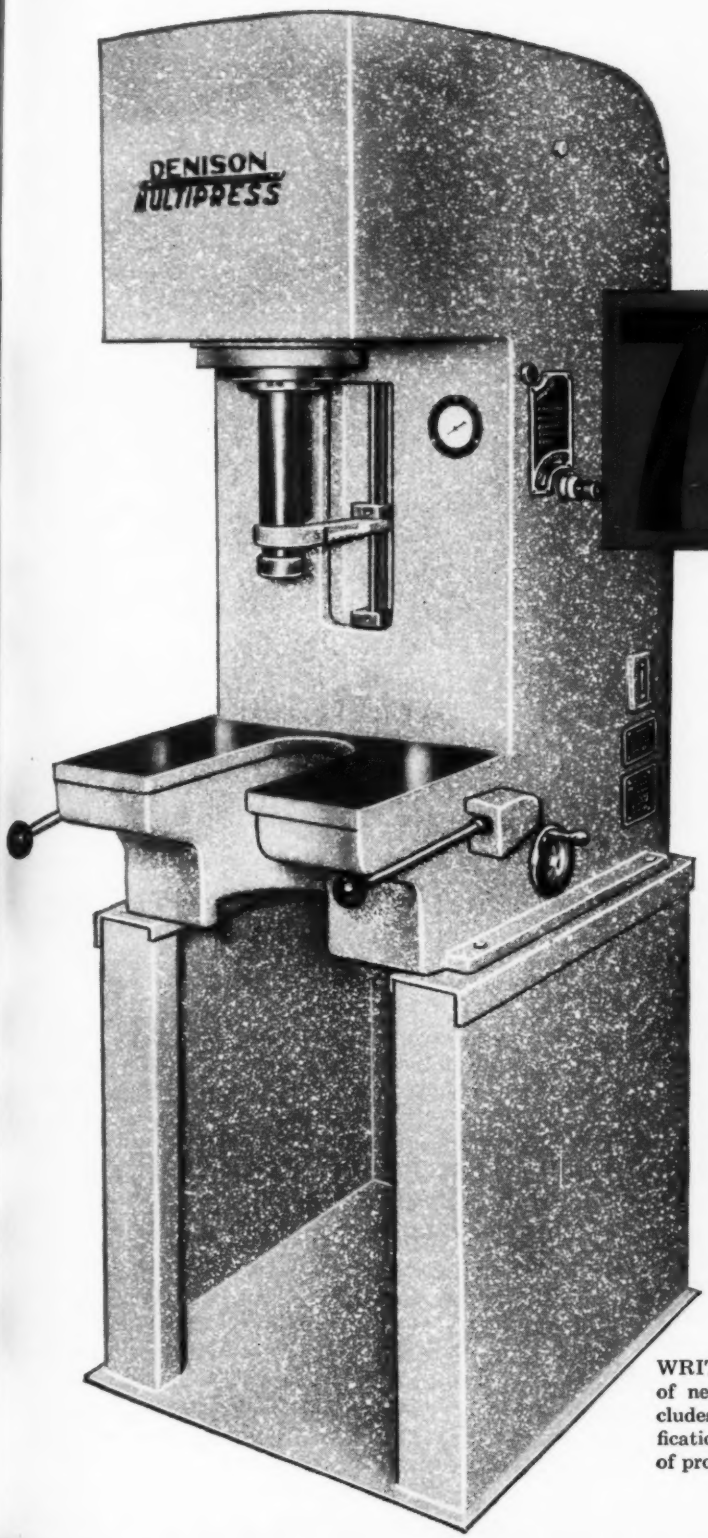
Announced by DENISON

NEW SERIES OF COST REDUCING HYDRAULIC MULTIPRESSES

Denison, Denison HydrOlLics, and Multipress are registered trademarks of Denison Eng. Div., ABSCO

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

DENISON HydrOILics



PACING THE PRESS INDUSTRY WITH...

7 major advancements made on an already efficient producer

NOW STANDARD ON THE NEW SERIES "R", "S" AND "T" bench-type presses to cut costs in even your toughest production job.

PRODUCES MORE PIECES-PER-HOUR ... 65% faster approach. Faster return speeds on the hydraulic ram give you more cycles-per-minute.

FASTER TO SET-UP ... new, quick, simple adjustment now sets position of ram in seconds. And you can "inch" the ram to the work under set pressure. Closer control of ram pressure is quickly attained with a newly developed relief valve.

SIMPLER TO TOOL ... there's more daylight to mount tools for manual or automatic production.

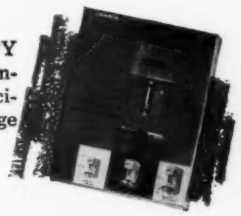
HANDLES WIDER RANGE OF WORK ... ram stroke has been doubled for greater tool clearance for long, deep work.

EASIER TO OPERATE ... there's more knee room for operator's convenience.

SIMPLER TO MAINTAIN ... complete motor and pump swing out of position to inspect and service the hydraulic system.

BUILT TO J.I.C. STANDARDS

WRITE FOR YOUR COPY of new Bulletin 324 ... includes application and specification data on wide range of production jobs.

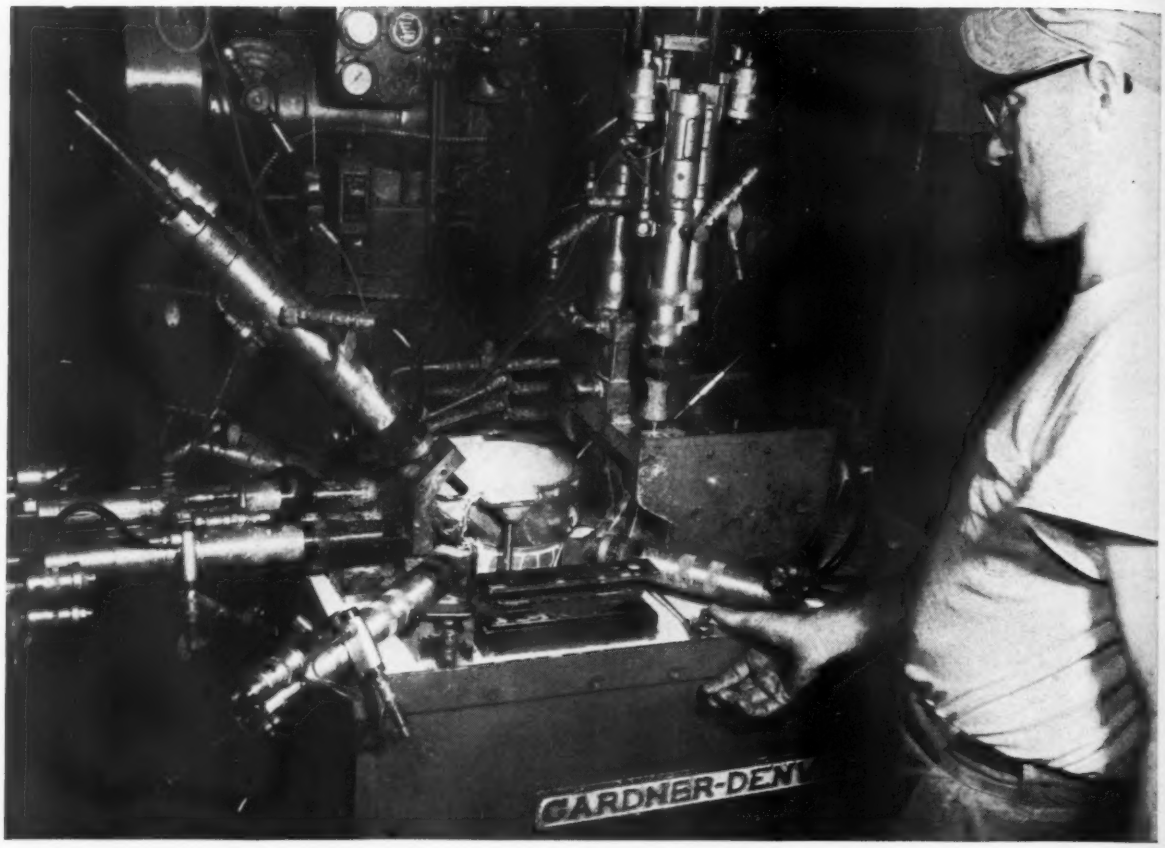


DENISON ENGINEERING DIVISION American Brake Shoe Co.

1197 Dublin Road · Columbus 16, Ohio

Denison Stocking Branch Offices: LOS ANGELES • HOUSTON • CHICAGO • DETROIT • ATLANTA • NEWARK • CLEVELAND

CIRCLE INFORM-A-GRAM KEY NO. 17



Time study clocks multiple drilling operation at 254 pieces per hour

15 HOLES DRILLED IN VACUUM CLEANER MOTOR BASE IN LESS THAN 15 SECONDS

Problem: To speed drilling of fifteen .120″-diameter holes in the motor base of a vacuum cleaner at Eureka-Williams Corporation plant in Bloomington, Illinois.

Solution: A specially designed Gardner-Denver multiple drilling machine. Ten drills, standard Model 92-2P "Airfeedrills"®, are permanently mounted on the fixture. Five "Airfeedrills" are vertically mounted on a reciprocating slide to facilitate loading and unloading the part.

How it works: Operator places the part in the fixture, then activates the following cycle: Two air clamps automatically hold the part in position. Then ten drills automatically start drilling, as the reciprocating slide moves into position and drills the remaining five holes. The operator then presses a release button which returns the reciprocating slide and deactivates the air clamps, leaving the part free for removal.

Cost-cutting results: A recent time study clocked this unique drilling operation at 254 pieces per hour—or a part processed in approximately *15 seconds*. This is a typical example of special machines designed and built by Gardner-Denver to solve tough production problems. For complete information, contact your Gardner-Denver representative.

GARDNER-DENVER Since 1859 100 1959 YEARS

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 18

MEN YOU SHOULD KNOW

The promotion of **W. E. Montgomery** to chief engineer, Carbide Division, was announced recently by Firth Sterling Inc.

N. W. Morelli has been appointed works manager of the Allis-Chalmers Works in Pittsburgh, following the retirement of **D. G. McArn.**

Six men have been promoted by The American Pulley Co. They are **Charles E. Bain,** general works manager; **W. L. Leonard,** chief engineer, power transmission equipment; **W. S. Nichols,** chief engineer, material handling and pressed metals specialties; **H. W. Leadbeater,** shop superintendent; **T. M. Keating,** production manager; and **J. T. Richards,** chief industrial engineer.

Newly appointed general manager of the Abrasives Division for Elgin National Watch Co. is **William H. Baudouine.**

Appointment of **John R. Gretzinger** to the newly created post of director of reliability and quality control at Buick Motor Division, was made known recently by General Motors Corp.

New vice president of engineering at Pesco Products Division, Borg-Warner Corp., is **Ted R. Thoren.**

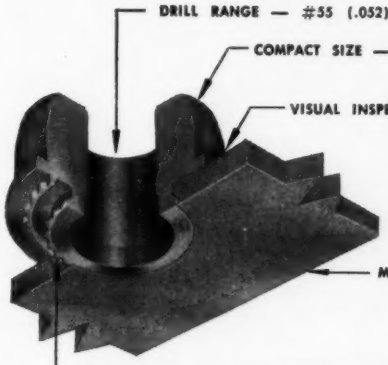
The election of **Russell A. Hastings** to executive vice president of the K. H. Huppert Co. was recently made known.

Now serving as assistant chief engineer for Tube Reducing Corp. is **Frederick P. Huston.**

Olof Landeck has joined Electro Engineering Works as production manager and **William Thorson** has been appointed facilities manager, under Landeck. Other changes include **Melville G. Freeman,** senior electrical design engineer, and **Wallace W. Wahlgren,** director of the new research and development laboratory.

...Continued on page 22

FOR REAL DRILL TOOLING ECONOMY


DRILL RANGE — #55 (.052) THRU 9/64 (.1406).
COMPACT SIZE — MINIMUM HEIGHT ADEQUATELY SUPPORTS DRILL, DIAMETER PERMITS CLOSE LAYOUT.
VISUAL INSPECTION — WHEN BUSHING IS FULLY INSTALLED, ITS SHOULDER SEATS ON TEMPLATE.
MATERIAL — INSTALLED IN .060 OR THICKER ALUMINUM.
SERRATIONS — DOUBLE ROW PROVIDES POSITIVE LOCK.

Inexpensive Press Type Anchor Bushings are simply pressed into punched (or drilled) holes in .060 or thicker aluminum drill templates and offer durable tooling life for high or low volume production.

The compact sizes of these bushings allow you to lay out very close hole patterns, yet the bushings provide the necessary drill support for perpendicular drilling. The double row of serrations at the base provides a positive lock between the bushing and the template to resist drill torque or template abuse.

To simplify template hole preparation, drill sizes are accommodated by only three sizes of bushings:

AB90 #55 (.052) THRU 9/64 (.1406)
AB91 #27 (.144) THRU "F" (.257)
AB92 #G (.261) THRU 7/16 (.4375)

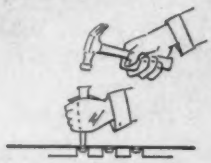
WRITE FOR OUR NEW BROCHURE ON PRESS TYPE ANCHOR BUSHINGS. IT TELLS HOW TOOLING ECONOMIES ARE OBTAINED, GIVES LAYOUT DIMENSIONS, INSTALLATION AND REMOVAL DATA, AS WELL AS ORDERING INFORMATION.

INSTALLATION

1
DRILL OR PUNCH HOLE IN TEMPLATE TO MATCH BUSHING PILOT DIAMETER.

2
PRESS BUSHING INTO TEMPLATE HOLE.

REMOVAL



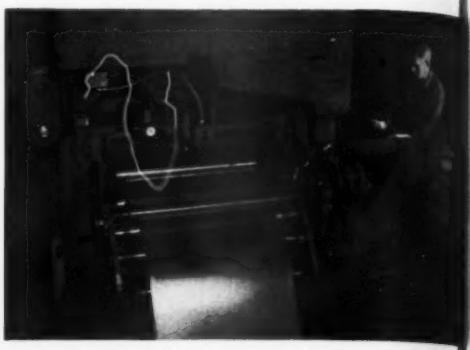
KNOCK-OUT BUSHING FROM UNDERSIDE OF TEMPLATE.

hi-shear RIVET TOOL COMPANY
2600 WEST 247TH STREET • TORRANCE, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 19

How to make large stampings more profitably with

AUTOMATIC PRODUCTIO



Minster Progress-O-Matic handles extremely wide coil (up to 30" width on this 150 ton press) you get full value from material, less scrap, greater tooling flexibility, multiple parts production, more profit.

Photos courtesy of container Company, Jersey

Minster Progress-O-Matic Presses

. . . make big progressive die parts automatically at high speeds.

. . . eliminate secondary operations on several presses.

. . . give you more parts per stroke when you double up parts or nest parts on wide material.

. . . have twin-drive gears . . . greater capacity above bottom of stroke for draw work and heavy material blanking.

. . . have feed built in uprights close to die, allows close control and support of material.

. . . capacity range 150 to 500 tons.

Talk to your Minster representative about the Progress-O-Matic press or write us for more details.

The Minster Machine Company • Minster, Ohio

MINSTER®

CIRCLE INFORM-A-GRAM KEY NO. 2

FOR ACCURATE LOCATING USE UNIVERSAL LOCATING PINS

Universal Locating Pins assure quick, accurate locating throughout even the longest production runs. They're hardened and ground to extremely close tolerances . . . precision made to give long service life for much less than the cost of ordinary tool-room pins.

Press fit, threaded or lock-screw types, round or relieved, are stocked in all standard sizes for immediate delivery. Write for catalog detailing locating pins plus other Universal production tools.

Relieved Press-Fit Pin

Threaded Pin

Lock Screw Pin

212

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

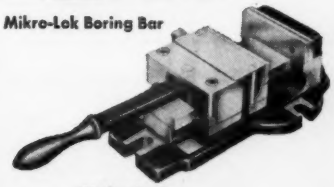
Standard Collet Chuck

Mikro-Lok Boring Bar

Boring Chuck

"Kwik-Switch" Tool Holder

Standard Drill Bushing



Wedge-Lock Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 21

WE GET **ORDERS, TOO!**

Lots of orders, from all over the world . . . orders for our famous BALL-BEARING PRECISION DIE SETS, now with Aluminum Bearing Retainers, for still longer operating life. We get orders, too, for our new M and L Type Die Sets, *all-steel* die sets at the price of cast iron. We're happy.

Many of your competitors are happy with their savings in TIME and MONEY when they use Lempco Die Sets.

If you're not already using Lempco Ball-Bearing Die Sets, better write us today for Catalog and Price Lists.

CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Men from page 19

Heinz Hanau was recently named director of engineering and research of Industrial Tectonics, Inc.'s Western Division.

Van Norman Industries, Inc., recently announced the appointment of **James N. F. Reynolds, Jr.** as vice president of manufacturing.

Raytheon Company's new director of manufacturing services, a newly created post, is **George A. Strichman.**

Dr. Stephen F. Malaker was recently appointed president of Cross-Malaker Laboratories, Inc., formerly Stephen F. Malaker Associates, and now a subsidiary of The Cross Co.

New manager of quality control for Pratt & Whitney Co., Inc., is **Herbert A. France, Jr.**

The Timken Roller Bearing Co. has made known recent promotions. In the Industrial Division, **R. K. McConkey** is general manager and **Wyn E. McCoy,** assistant general manager. **A. E. Matejka** serves as chief product engineer; **R. H. Holsing,** chief engineer, Rock Bit Division; and **C. L. George** assistant chief product engineer.

Joseph C. Olson has taken over as vice president of manufacturing for The Bullard Co.

Now serving as president and chief executive officer of Pines Engineering Co., Inc., is **Irwin W. Killian.**

Newly elected president of Metal Carbides Corp. is **R. Thornton Beeghly.** Other officers include **J. A. Ritz,** vice president; **D. B. Peterson,** treasurer; and **W. E. Scheetz,** secretary.

Marchant Calculators Division of Smith-Corona Marchant Inc. has promoted four men to high level posts. **Robert N. Mitchell** takes over as general superintendent; **Thomas E. Heumann** becomes quality control manager, and **Dennis L. Scott** is manufacturing engineer.

Appointment of **Charles E. DeMars** as plant engineer for Tranter Manufacturing, Inc., was made known recently.

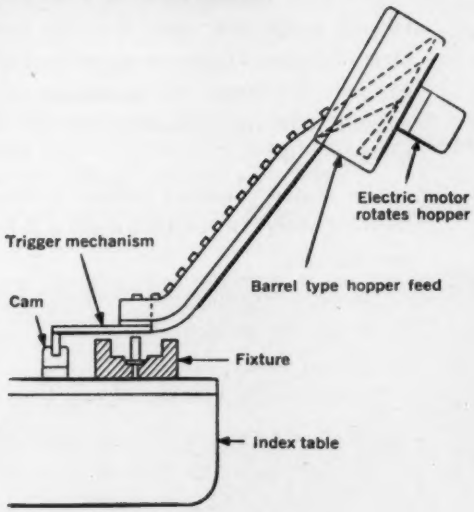
This packaged potential for complete automation requires only proper tooling to make it 100% automatic. Retooled for specific jobs its usefulness can be extended many times.

PRACTICAL AUTOMATION UNDER $10,000

Eliminates Parts Handling, Eliminates Manual Skill

Both quality and production output benefit when the H-P-M automatic index table is put to work. With all press motions easily preadjusted for correct pressure, stroke and ram speed, the uniformity of force applied to finished parts is removed from the realm of guesswork. With automatic loading of parts for many small assemblies, manual effort is removed from the job. These two elements, in combination, assure better quality, faster production at lower cost.

The H-P-M C-Press is available in 5, 10, and 15-ton models for the bulk of mass produced assembly work in your shop. Let an H-P-M field engineer explain how low cost automation with H-P-M's can be put to work for you; how this initial investment in modernization can be applied and reapplied to countless production tasks.



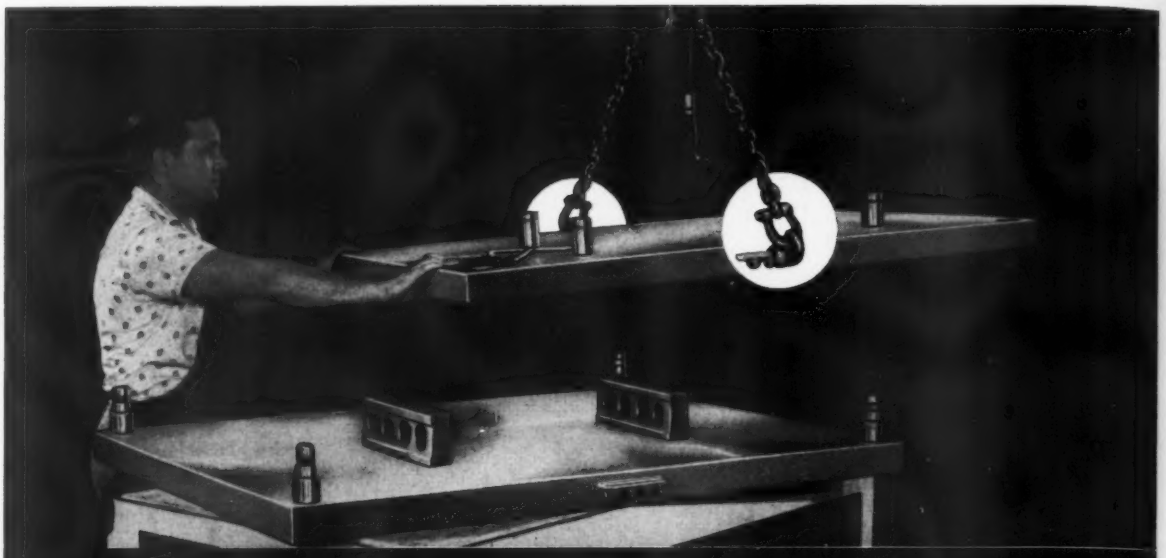
Many small parts can be hopper fed as typified in this sketch. Eliminate the fumbling and slowdown of feeding small parts manually and your production will improve by "hundreds" per day.

H945

THE HYDRAULIC PRESS MFG. COMPANY

A Division of Koehring Company, Mount Gilead, Ohio, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 23



LIFT and TURN LARGE and SMALL DIE SETS, QUICKLY, SAFELY

with **SUPERIOR**

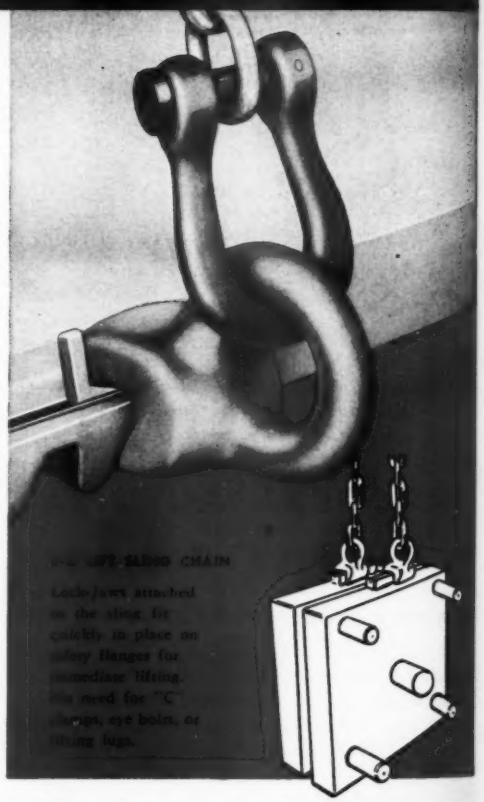
LOCK JAW LIFTING DEVICE

Superior's LOCK-JAW is a simple, self-locking wedge that teams with the patented Superior Safety Flanges to permit one man to lift and turn larger sets in minutes — with positive protection for costly dies and human life and limb.

The tendency toward careless blocking is removed when LOCK-JAWS make it so simple, safe and easy.

One of the many exclusive safety and handling features offered ONLY on Superior Die Sets.

Write or Call for your free 28 page catalog.



SUPERIOR
STEEL PRODUCTS CORP.
2754 SO. 19th ST., MILWAUKEE, WIS.

Representatives in these Principal Industrial Centers

CEDAR RAPIDS, IOWA
Empire 2-7831
CHICAGO, ILLINOIS
Off.: Randolph 6-8871
Res.: Keystone 9-9800
DAYTON, OHIO
Baldwin, 2-6209
DENVER 1, COLORADO
Enterprise 234
PITTSBURGH, PA.
Tuxedo 4-4040

INDIANAPOLIS, INDIANA
Clifford 5-5668
LANSING, MICHIGAN
Iv-9-0214
MEMPHIS, TENNESSEE
Fairfax, 3-7727
ROCKFORD, ILLINOIS
Off.: 9-9331
Res.: 7-9403
FAIRFIELD, CONN.
Edison 4-4282

ST. LOUIS, MISSOURI
Jefferson 5-1223
BRADENTON, FLORIDA
5-9661
MINNEAPOLIS, MINN.
Fr. 1-1321
RACINE, WISCONSIN
Melrose 2-1900
WARWICK, R. I.
Turner 4-2907

MELROSE PARK, ILLINOIS
Filmore 5-5910
SYRACUSE, NEW YORK
Granite 4-0458
CHESHIRE, CONN.
Browning 2-4887
WEST NEWTON, MASS.
Bigelow 4-2070 & 2-6771
UNION, N. J.
Murdock 8-2270

BALTIMORE, MARYLAND
Belmont 5-2780 & 5-9492

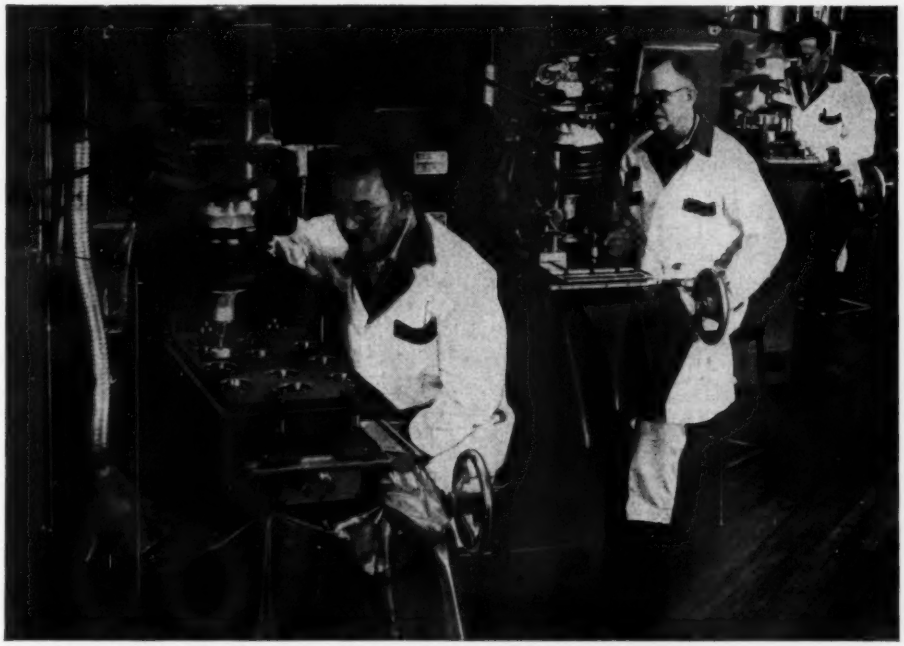
2 plants to serve you
MILWAUKEE, WISCONSIN
Mitchell 5-6027
PLAINVILLE, CONN.
Sherwood 7-2761

CIRCLE INFORM-A-GRAM KEY NO. 24

Val Koller tells why he continually adds more Moore Jig Borers and Jig Grinders to his team

This is another in a series featuring the views of owners of leading tool and die companies.

by **VAL KOLLER**
President
Koller Die & Tool Co.,
Milwaukee, Wisconsin
Manufacturer of Dies
and Metal Stampings—
Tools—Jigs—
Fixtures and Gages—
Special Machines



Moore equipment in Koller plant, with new #3 Jig Grinder in foreground.

"Since our foundation in 1919 it has been my personal objective to strive for perfection. Since that time perfection has evolved into a .000010" word for tool and die makers. Such precision is rapidly becoming common-place...particularly in electronics and guided missile fields of production. With the installation of Moore equipment in 1950, we have been able to compete successfully in a caliber of work that before was not possible.

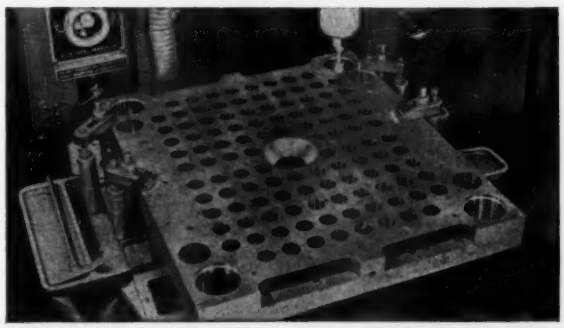
"Since that initial investment in a Moore Jig Grinder we have continually added Moore teammates to our toolroom. Today we operate more Moore equipment than any other top contract shop in the greater Milwaukee area.

"The tolerances and intricate contours now required make Moore Jig Borers and Jig Grinders a must in each toolroom. These machines operate at full capacity each workday with negative downtime due to mechanical failures. In fact, we have found that it costs real dollars and cents to operate *without* Moore equipment.

"This cost factor is just one of many reasons why we recently added another teammate to our toolroom ...the new Moore Model #3 Jig Grinder. This machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better."

Write today for literature describing the unique features of #3 Moore Jig Borers and Jig Grinders or see our catalog in SWEET'S MACHINE TOOL FILE.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport, Connecticut



This 116 cavity mold plate was completely jig ground at Koller on a Moore Jig Grinder. Tolerances: hole location ± .0001", hole diameter ± .0001".

HOLES, CONTOURS AND SURFACES, tells how to produce tools and dies *the modern way.* 424 pages, 495 illustrations. $5 in U.S.A. $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 25

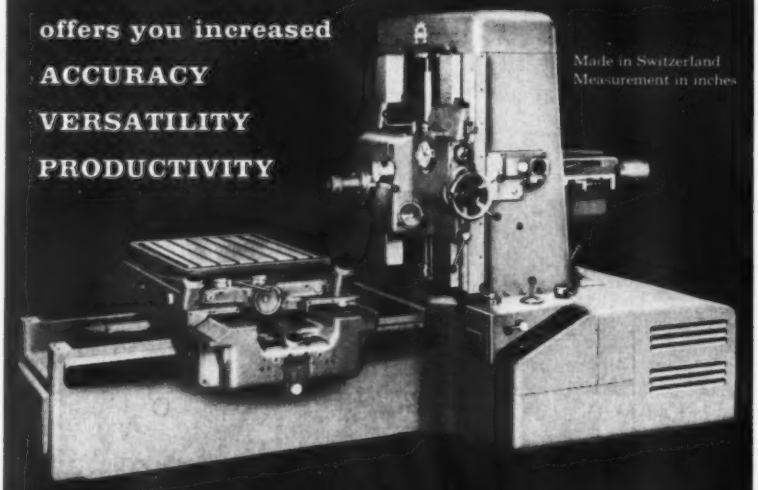
Now

AUTOMATIC POSITIONING

with the

DIXI 75 horizontal optical jig borer

offers you increased
ACCURACY
VERSATILITY
PRODUCTIVITY



Made in Switzerland
Measurement in inches

- Automatic positioning can be changed instantly to manual operation
- Projected optical setting — direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel
- Hydraulic feeds and infinitely variable spindle speeds
- Rear support optional

See the DIXI 75 in operation at the
NATIONAL METAL CONGRESS AND EXPOSITION
BOOTH 1346
International Amphitheater
Chicago
NOVEMBER 2nd - 6th

MBI

M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 26

Talk of the Month

Europe's Challenge to American Ingenuity

by A. Lightfoot Walker

PRODUCTION AND PRODUCTIVITY have been rising in Europe. What impact does this have on American business, when we take into account comparative inflationary pressures in Europe and the United States? What has been the effect on United States exports, particularly of manufactured goods? What effect will the European Common Market have on our competitive trade position? Can the United States maintain its competitive position in world markets? What new approaches to the problem are being explored by American business?

The United States in 1958 exported about $9.4 billion in manufactured goods, still more than double our imports. But the ratio has declined from past years. In the years 1952-1956, our exports of manufactured goods were triple our imports.

The most dramatic example of our changing competitive position is in passenger autos. In 1958, European makers sold 8% of the new cars in the U. S. market. Imports of cars tripled those of the previous year. We still export more cars and trucks and parts than we import but the trend is unfavorable. American

... Continued on page 23

Mr. Walker is president of Rheem Manufacturing Company, New York City, and presented this talk at the 18th Annual Business Conference, Stanford University, Stanford, Calif.

Talking About Die Sets

with
Phil Marsilius
Executive Vice-President
The Producto Machine Co.

Die Set Maintenance in the Pressroom—The vital die-maintenance procedures required periodically when a die is removed from the press for sharpening should be coupled with systematic die set inspection and maintenance in the pressroom.

In addition to having a planned schedule of lubrication (based on any of the methods previously discussed in this space), you can make sure of getting the most out of your investment in die sets—and the costly dies and presses with which they are used—by following a simple set of procedures for inspecting and maintaining die sets in the pressroom.

Although there are no hard-and-fast rules that can be established for all die sets, the procedure listed below is generally followed at leading stampings plants in the East. These companies point out that die sets used in the cutting of extremely thin material or for very critical parts would naturally require a more stringent inspection than those used for blanking heavy material or for comparatively simple parts.

At one plant, specializing in long runs of close-tolerance parts for the electronics industry, the procedure followed is:

1. No inspection of the die set during production run unless, of course, there is overheating, pick-up on the guide pins or other obvious difficulties.
2. When the die is taken off the press for sharpening or maintenance, the die set is visually inspected for pick-up or score marks on either the guide pins or bushings. Pins and bushings are carefully cleaned to remove excess lubricant.
3. After approximately 1,500,000 strokes, the set is thoroughly checked for wear on both the pins and bushings. On the average, up to .0003″ wear on pins and bushings is allowed before replacement with new components is scheduled. In addition, the die set is placed on a surface plate and an indicator is placed over one end of the set. An attempt is then made to rock or twist the set by hand to establish how much the die set can be deflected. On a 10″ set, a maximum of .005″, but usually less, total deflection is allowed.

Four-stage blanking and shaving die, Lenkeit Machine & Tool Co., Inc.

pressroom foreman prefers Producto die sets

They keep his downtime down

Keeping production *up* and downtime *down* is the main job of the pressroom foreman. He knows Producto die sets can help him do this job successfully because they maintain accuracy for long runs. All catalog steel sets are annealed to prevent distortion.

He is aware that Producto can provide him with any type of die set he needs—whether for standard or special presses—in a wide range of sizes and thicknesses, with or without clamping flanges.

The pressroom foreman knows that Producto guide pins are mirror-finished to eliminate scoring, and that Producto die sets are available with a variety of lubrication devices to keep them "running cool".

He knows, too, that he is not restricted to the use of predetermined press stroke or shut height because Producto offers an unlimited choice of pin and bushing lengths. Moreover, he can get the bolster he needs to protect his die at the same time he gets his die set. Both die set and bolster can be ordered in steel or cast semi-steel depending on strength requirements.

The pressroom foreman realizes that Producto Qwik-Fit Die Sets make "take-apart-and-put-together" easy during die maintenance. He also knows that Qwik-Fit removable pins and clamp-type bronze bushings are available when the application calls for them.

He can *produce more* with Producto die sets. So can you.

A WEALTH OF DIE SET KNOWLEDGE is packed into Producto's Catalog No. 11 and regular issues of *Die Set Digest*. Write today for these free aids.

THE PRODUCTO MACHINE COMPANY
945 Housatonic Avenue, Bridgeport 1, Connecticut

Wherever die sets are used
PRODUCTO
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

Because the die set plays such an important part in prolonging the accuracy and lifetime of a die, it pays to take the little extra time required to do justice to die set maintenance in the pressroom.

4. During regular or periodic regrinds, the die set is not checked for bent or distorted punch and die holders unless the die has been damaged or there is reason to believe the set may have warped.

During the overall period, if the pins and bushings are replaced, the punch and die holders themselves are checked for warpage or distortion. If necessary, these components are reground prior to assembling the new pins and bushings.

CIRCLE INFORM-A-GRAM KEY NO. 27

The new Vertical Illuminator and the AO Spencer Cycloptic Stereoscopic Microscope make a unique team that can be the answer to your problem whether it's the inspection of detail in small diameter, deep hole borings, or delicate assembly of miniaturized parts where every move is critical.

This low-cost illuminator readily attaches to the Cycloptic to provide efficient, shadowless illumination deep inside small orifices...and the Cycloptic delivers realistic, erect, true three-dimensional magnification of the illuminated detail.

The remarkable long working distance afforded by Cycloptic (up to 7 inches when Vertical Illuminator is used with 53 and 59 Series) gives you *plus* advantages... permits ample room for large size objects or inspection and assembly tools.

Add this unit to your present Cycloptic or ask about low-cost Vertical Illuminator and Cycloptic stereoscopic microscope combinations.

American Optical COMPANY
INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

Dept. V179
Please send me FULL INFORMATION on the NEW AO SPENCER VERTICAL ILLUMINATOR AND CYCLOPTIC MICROSCOPES

NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE____

CIRCLE INFORM-A-GRAM KEY NO. 28

...Month's Talk from page 26

manufacturers in general are running into stiffer price and quality competition from European companies.

The reasons for this lie on both sides of the water. European countries have rehabilitated their industry. They have started from a low wage base, itself a tremendous competitive advantage. The American manufacturing worker receives wages three times that of the worker in the United Kingdom and four times that of the worker in Germany. With new equipment installed since the war, many European companies have increased their productivity at a higher rate than their American counterparts. As markets have widened for these European companies, they have received the benefits of low cost quantity production.

* * * *

The Europeans, moreover, see very clearly their vital stake in building up their foreign trade — in terms of national survival. These countries for the most part rely heavily on imports. To avoid national bankruptcy, they **must** export. They have saved their dollars, built up their industries—and in instances tightened their belts—to achieve the stronger position they find themselves in today. And not the least important factor in their success has been national policies designed to assist sales of goods to customers in other countries, such as loans with low interest and long term payments.

* * * *

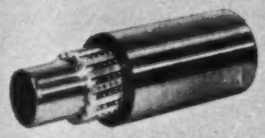
On our side of the ocean, the competitive position of American manufacturers in world markets has declined because our already high wages have pushed even higher without compensating gains in productivity.

I believe we have another inflationary factor that is largely

...Continued on page 30

New Bliss ball bearing die sets shrink hours into minutes in die making and changeover!

Here are seven reasons why...



- Negative clearance means longer die life. No die shifting. Misalignment is eliminated.
- Ball bearing construction speeds assembly and disassembly. Yet installation is conventional. Die builder doesn't work in reverse.
- Smooth even preloading prevents shock...assures alignment of punch and die. Off-set design reduces wear.
- Easy oiling and maintenance. Loosen the set screw, the retainer is out and back in minutes.
- Eliminates downtime caused by seized pins and bushings.
- Standard components—no need to stock or wait for specials.
- Existing sets can be easily and economically converted to Bliss-Dieco ball bearing design.

Mfd. under U. S. Pat. 2,311,815

Note: Bliss-Dieco ball bearing assembly can be stripped from guide post on inclinable or straight side presses.

Bliss' patented ball bearing die set has money and time saving advantages no other die set has—conventional or otherwise. It gives you more burr-free parts between regrinds...fewer rejects.

It's the most revolutionary change in bearing design to hit the die industry in years. Assembly and disassembly are a snap. Die making and tryout time are slashed. No more time lost because of seized pins and bushings.

Pre-loaded ball bearings provide *negative clearance* for perfect die register, even after millions of hits.

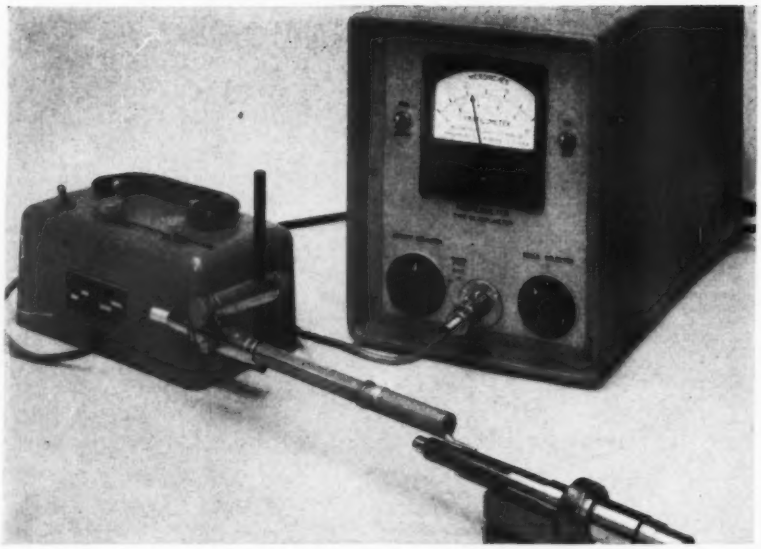
What's more, cleaning and lubrication are a matter of minutes with this unique die set: You just loosen the self-locking set screw, drop the bearing retainer, clean it, reposition it and tighten the screw again. Light bearing oil is all that's needed.

In short, with the Bliss ball bearing die set you get maximum die life—"cleaner" parts—fewer die breakdowns. For further information, write E. W. Bliss Company, Die Supply Division, 1400 Brookpark Road, Cleveland, Ohio. We'll be glad to send you an illustrated technical bulletin that will tell you how you can have ball bearing die sets at a surprisingly low cost or how you can convert your existing die sets to the new Bliss-Dieco design.

dieco DIE SETS

E. W. BLISS COMPANY
DIE SUPPLY DIVISION
Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 29



PERTINENT QUESTION:

WHEN do you need the Profilometer®?

FACTUAL ANSWER:

Whenever you must precisely *know* the roughness of *any* production surface — quickly, dependably, in microinches (arithmetical or rms).

FREE BULLETIN LT14 gives details — describes cost-saving applications. May we send you a copy?

MICROMETRICAL MMC MANUFACTURING COMPANY
345 S. MAIN ST. ANN ARBOR 8, MICHIGAN

Manufacturer of the PROFILOMETER®, PROFICORDER®, MICROCORDER, WAVOMETER®, ANDEROMETER®, VAROMETER, CHART VIEWER • Exclusive American Sales Agent for CENSOR Dimensional Gaging and Sorting Equipment

CIRCLE INFORM-A-GRAM KEY NO. 30

... Month's Talk from page 28

overlooked—and that is taxation. In fact, I believe the effect of taxation on inflation is misconstrued by some theorists. Taxes are a cost of doing business. If your taxes increase, you must increase your selling price to maintain a rate of return on your investment necessary to survival and growth. And corporation taxes in this country today are generally higher than they are in Europe.

It is true that there has been enough increase in productivity so that inflation in the United States is not yet completely out of hand; but the growth of inflation today is higher here than in Europe ...

The relentless push of inflation has added to our competitive difficulties. As a result, many people believe that we may be pricing ourselves out of world markets. There is no doubt that this is true of many manufactured products. But we still remain strongly competitive in many fields and there is a determination to do so. Our basic strengths in international competition — our tremendous productive capacity and technical competence—should continue to give us a strong competitive position in world markets, but not necessarily in those manufacturing fields where we have held leadership in the past. So we are going to have to exercise ingenuity to stay ahead.

Many business economists agree on two fundamental lessons from which constructive steps may be developed to protect our existing markets and to build new markets for American export products. In a recent study by the Committee for Economic Development two fundamental points were made:

1. As the competitive power of other countries, and their reserves, increase, we are entitled to expect and insist upon progressive dismantling of those

... Continued on page 32

Cuts assembly time in half with...

NEW ROTOR J-40S IMPACT WRENCH

JOB: Driving ⅜" bolts to attach cover and insulators on distribution transformers. Formerly used ratchet hand wrench... fatiguing to the operator... a bottleneck.

RESULTS: New Rotor J-40S Air-Powered Impact Wrench (with special extension drive to clear insulators) does the work in less than half of former time. Bolt tightness is uniform. Operator fatigue is eliminated.

Ask for demonstration of Rotor portable tools to see how they can cut *your* costs! Write for a free copy of Bulletin 53B.

Courtesy Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

HAVE YOURS? 100-page handbook for portable air tool users. Request on your letterhead.

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

ROTOR TOOLS
CLEVELAND, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 31

...Month's Talk from page 30

barriers to our exports that were justified by the "dollar shortage."

2. We are not immune from the law that a country that inflates more rapidly than others will meet trouble in its foreign trade and payments.

Now, a few words about the European Common Market. There is no question in my mind that its creation of a new tariff differential against non-Market countries will weaken even further the competitive trade position of American manufacturers. But as the Committee for Economic Development points out: "The objective of the Common Market is to increase the efficiency and raise the income of the area, chiefly by giving greater scope to competition. We are confident that this objective will be achieved. To the extent that it is achieved, the rest of the world will benefit."

The Committee notes that the rest of the world may not passively accept tariff discrimination and that major repercussions may be set off. Surely economic statesmanship of the highest order on the part of the United States will be required. How can we exercise the patience and self-control that may be necessary to help the Common Market achieve its objective—to raise the standard of living of this area? This would certainly be in our best long-term interests. Every rise in Europe's standard of living relative to our own makes more possible a state of true competition whereby American and European manufacturers may compete on a comparable cost basis and without tariff restrictions.

In the meantime, I am convinced American manufacturers may, by exercising ingenuity and by making full use of their natural production advantages, raise our total trade with Common Market Countries to even higher levels than at present. But the balance of exports and imports for some years will probably continue to be less favorable to the United States in the development of trade as a two-way street.

So far, I have not mentioned the opportunity which exists for American manufacturers to take part in the growth of the Common Market economy in another way.

This is by direct investment of private capital and technical competence in European industry. The book value of United States direct investments in manufacturing in the Common Market in 1957 was $717,000,000. A total of $56,000,000 or almost 8% was invested in 1957.

Our company, in its approach to selling Rheem products overseas, has historically placed emphasis on making them abroad.

...Continued on page 34

LOOK!

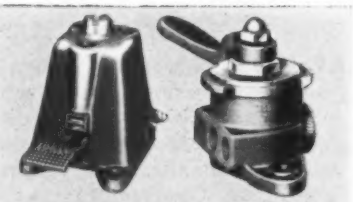
LOGAN HAS IT!

RIGHT PRICE
TOP QUALITY
PEAK PERFORMANCE

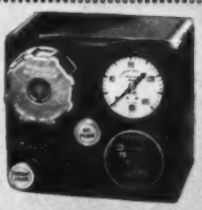
the most complete line of
POWER CHUCKING EQUIPMENT

LOGANSPORT MACHINE CO., INC.
844 CENTER AVENUE, LOGANSPORT, INDIANA

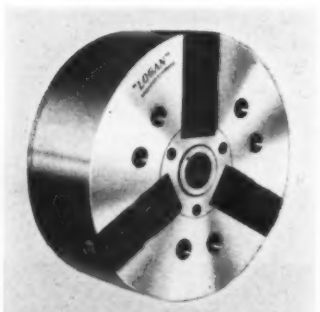
PLEASE SEND COPY OF CATALOG
☐ 100-1 AIR CYLINDERS
☐ 100-2 MILL-TYPE AIR CYLS.
☐ 100-3 AIR-DRAULIC CYLS.
☐ 100-4 AIR VALVES
☐ 100-5 LOGANSQUARE CYLINDERS
☐ 100-6 ULTRAMATION CYLINDERS
☐ 200-2 PRESSES
☐ FACTS OF LIFE
☐ 200-1 HYD. POWER UNITS
☐ 200-2 ROTOCAST HYD. CYLS.
☐ 200-3 750 SERIES HYD. CYLS.
☐ 200-4 AND 200-7 HYD. VALVES
☐ 200-6 SUPER-MATIC CYLS.
☐ 200-1 CHUCKS
☐ ABC BOOKLET
☐ CIRCUIT RIDER
TO.
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____



Logan Control Valves—Complete line of actuators available—for manual, semi-automatic or automatic control.



Model 400 RFL Unit Reducing Valve, pressure gauge and lubricator in compact aluminum housing.



Logan Standard Chucks from 6" to 24" diameter; specials to meat your needs.

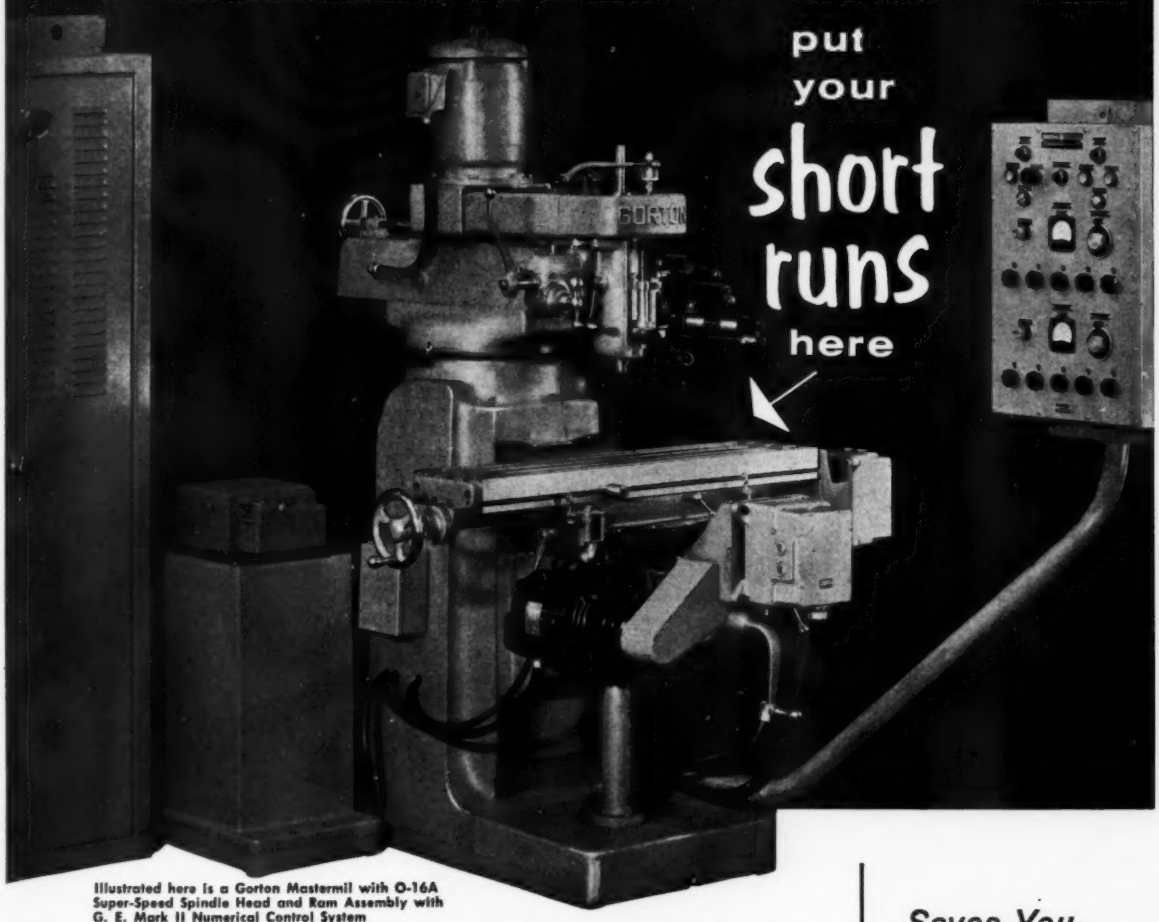
Logan Double Acting, rotating type cylinders. Air operated sizes 1½" to 20" bore. Hydraulic operated 3" to 14" bore. Hollow or closed center.

FREE SEND FOR YOUR COPY OF LOGAN "CIRCUIT RIDER"
A 32-page manual on fluid power circuits (fifth edition) completely revised to present current engineering trends.

MEMBER Natl. Mach. Tool Builders' Assn. Natl. Fluid Power Assn.

CIRCLE INFORM-A-GRAM KEY NO. 32

FOR NUMERICAL CONTROL AT LOWEST COST



Illustrated here is a Gorton Mastermil with O-16A Super-Speed Spindle Head and Ram Assembly with G. E. Mark II Numerical Control System

GORTON NUMERICAL CONTROL
is field tested and proved in use

This is how Gorton Numerical Control saves you money on short runs:

- — eliminates elaborate and costly tools, dies, jigs and fixtures
- — wastes no time because operator does not "pace" the work
- — makes no mistakes because operator skill not required
- — extreme, repetitive accuracy is easy and automatic
- — change overs in set-ups can be made quickly
- — signals operator when tool changes are needed
- — guides cutter in close quarters without damage to work or cutter
- — making punched tape is simple typewriter operation

Punched tape . . . or magnetic tape control . . . is available to you on SIX standard Gorton machines and also on Gorton custom-designed machines. You'll be agreeably surprised when you learn the low cost of Gorton Numerical Control and how much more it gives you for your money. For full information write

Saves You Money on —

- face milling
- side milling
- end milling
- straight line cavity milling
- slotting
- drilling
- reaming and boring

Your letterhead inquiry will receive prompt attention.

GORTON

GEORGE GORTON MACHINE CO.

1209 RACINE STREET, RACINE, WISCONSIN

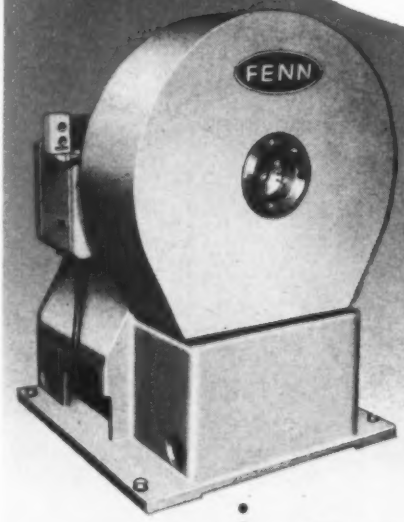
SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

CIRCLE INFORM-A-GRAM KEY NO. 33

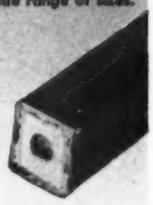
Only Fenn MAKES ALL TYPES OF SWAGING MACHINES

More and more precision metal forming operations are being performed on swaging machines because of low initial and low operating costs plus substantial savings in metals. Whether your specifications call for pointing, forming, assembling, internal reduction, or swaging squares and rectangles only Fenn offers you the model and size to exactly meet your requirements because *only Fenn makes all types of swaging machines.* Write for Fenn Swaging Catalog!

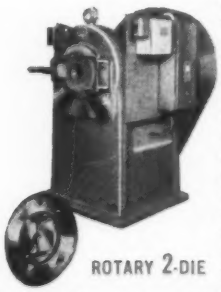


New! STATIONARY DIE SWAGING MACHINE

Newest addition to the most complete line of swaging machines. Ideal for use where it is desirable to keep work from rotating such as in swaging square and rectangular shapes. Inherent construction provides quieter operation and minimum operator fatigue. Available in wide range of sizes.

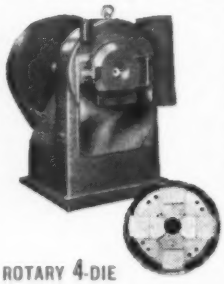


Square shaped heating element formed on Fenn Stationary Die Swager. Note round center element surrounded by compacted ceramic insulation.



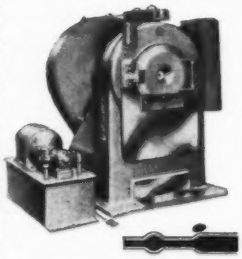
ROTARY 2-DIE

The workhorse of modern swaging machines and applicable to most swaging requirements. Low initial cost, wide range of sizes and capacities.



ROTARY 4-DIE

Ideal for swaging higher tensile materials, greater reduction per pass, and steeper angles of reduction. Also permits easy feeding.



HYDROFORMER

Equipped with special hydraulically actuated wedges that permit wide die opening. Used for internal and central reductions, and attaching fittings such as balls to cables.

FENN *Sets the Pace* IN SWAGING

THE FENN MANUFACTURING COMPANY · 401 FENN ROAD · NEWINGTON, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 34

. . . Month's Talk from page 32

Since 1937, we have followed a policy of seeking to participate with local capital in establishing manufacturing plants in foreign countries. Today, Rheem products are made by affiliated or associated companies in 21 plants in 15 countries abroad . . . As a general rule, we have followed a policy of retaining a large proportion of earnings in our foreign operations for their growth and development. All of our overseas operations have an unbroken record of profitability and have returned substantial dividends to our company.

At the same time, they have proved to be profitable investments for our foreign partners. They have provided employment for nationals of the host countries. Only one of our plants has an American manager, and that is a new operation we opened this year in Chile. Our plants abroad have also returned benefits to this country by their development of numerous production and technical innovations.

The result has been good business for our company, and good business for our country. There is unlimited potential for forging new bonds of international goodwill—as well as higher living standards for all people—through the joint participation of American and foreign capital and enterprise in business associations abroad that promise mutual benefits. This world approach to development and growth of American business can be one of the most persuasive—and economical—answers the American people can give to the challenge of competitive communism. eal

PROTECT YOUR FUTURE—

BUY

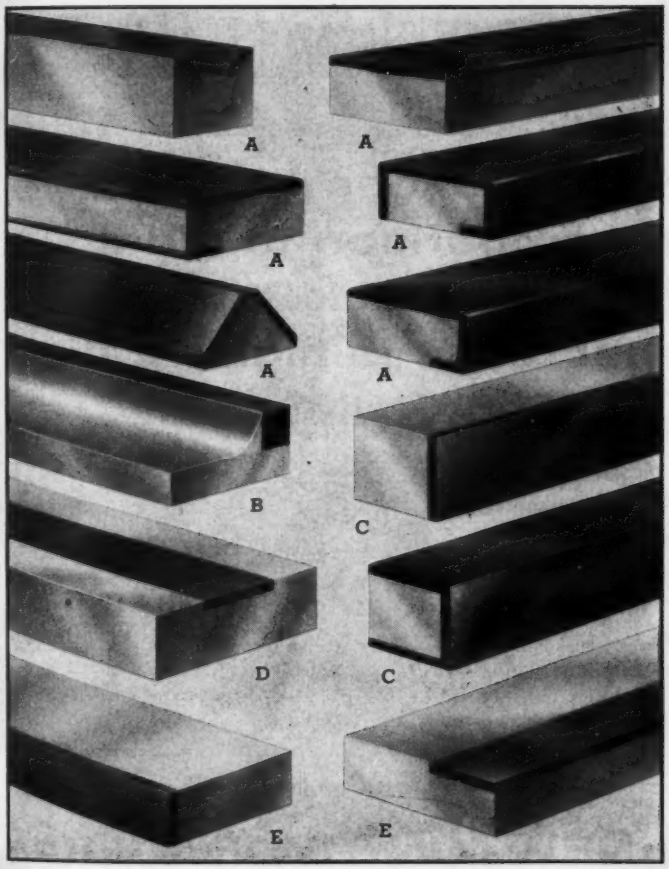
U. S. SAVINGS BONDS

TODAY!

O-KNI-CO MACHINE TOOL news
PRODUCTION FACTS THAT INCREASE YOUR PROFITS
PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO

NEW READY MADE STANDARD HARDENED SHAPES SAVING MONEY FOR HUNDREDS OF COMPANIES

USED FOR DIES, DIE SECTIONS, FLANGE SECTIONS, WAYS, GIBS, RAILS, WEAR PLATES. CARRIED IN STOCK BY OHIO KNIFE CO., CINTI., OHIO.



A—Hardened Ways and Slides B—Composite Die Sections
C—Heel Block D—Center Clad E—Flange Slide

Over 12 standard cross sections in over 80 sizes now available.

The multiple use of these sections by machine tool builders, die makers, etc., has increased tremendously. Great savings are achieved by being able to order from stock and in lengths up to 120". They are delivered to the customer with cutting, forming or wear surface already machined, hardened and ground. The soft steel backing, to which specially hardened tool steel is clad, can be drilled quickly for dowel and screw holes. The special O-Kni-Co hardening process (65-66) Rockwell to the full depth of tool steel along the entire length of the section develops tremendous wear resistance. They are precision made to the closest tolerances. Also available are clad aluminum bronze wear plates (¼" thick aluminum bronze clad to a tough, easily machinable steel base.)

FREE technical literature available. Check off—mail coupon today.

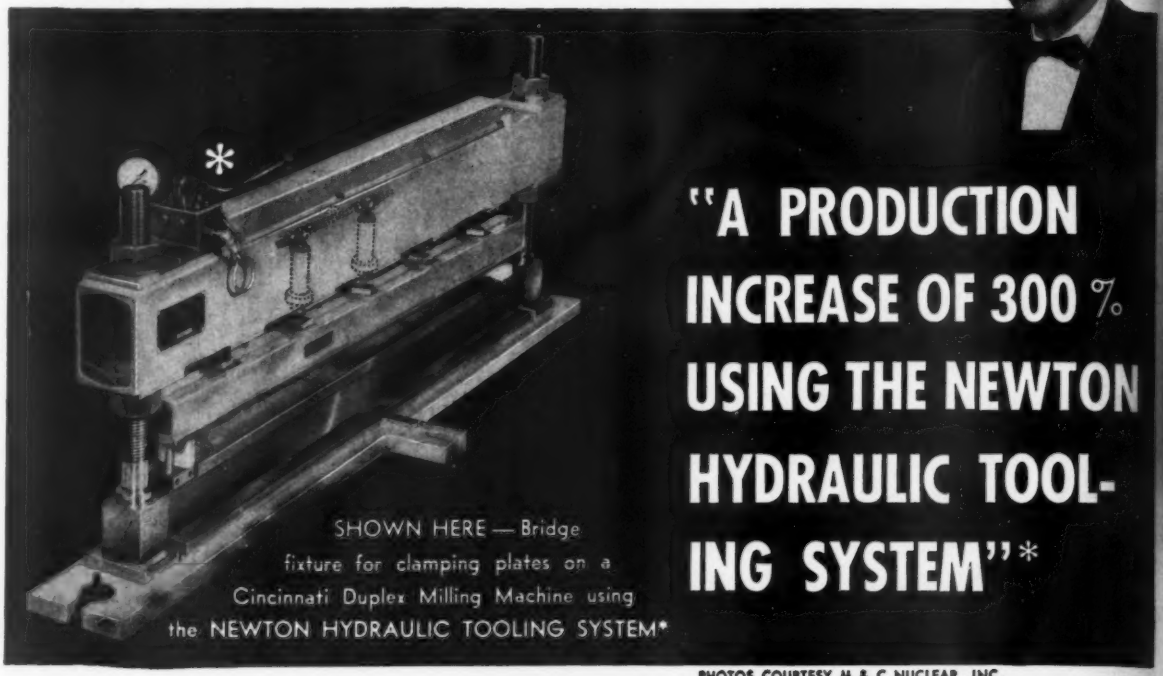
THE OHIO KNIFE CO., Dept. 100LL
Cincinnati 23, Ohio
Gentlemen: Please send me free copy of:
☐ BULLETIN-A describing 12 standard cross sections in over 80 sizes

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 35

Mr. Haydn Hirst, Tool and Methods Engineer, M & C Nuclear Inc., Attleboro, Mass.—the nation's largest privately owned plant for the production of nuclear fuel elements.

MR. HAYDN HIRST, *TOOL & METHODS ENGINEER REPORTS —*



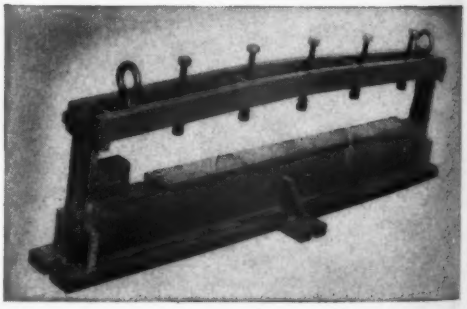
SHOWN HERE — Bridge fixture for clamping plates on a Cincinnati Duplex Milling Machine using the NEWTON HYDRAULIC TOOLING SYSTEM*

"A PRODUCTION INCREASE OF 300% USING THE NEWTON HYDRAULIC TOOLING SYSTEM"*

PHOTOS COURTESY M & C NUCLEAR, INC.

" . . . we have reduced floor to floor time to 7 minutes. In comparison to old style manual clamping, which took 21 minutes, our productivity increase is highly satisfactory." M&C NUCLEAR, INC. Attleboro, Mass.

Pressure is so controlled on the Newton Hydraulic Tooling System,* that the most fragile assemblies are held with a minimum of distortion. The Newton Hydraulic Tooling System* is ideal for clamping odd shaped pieces with evenly balanced pressure . . . and no adjustments required.



Bridge Fixture using old style manual clamping.

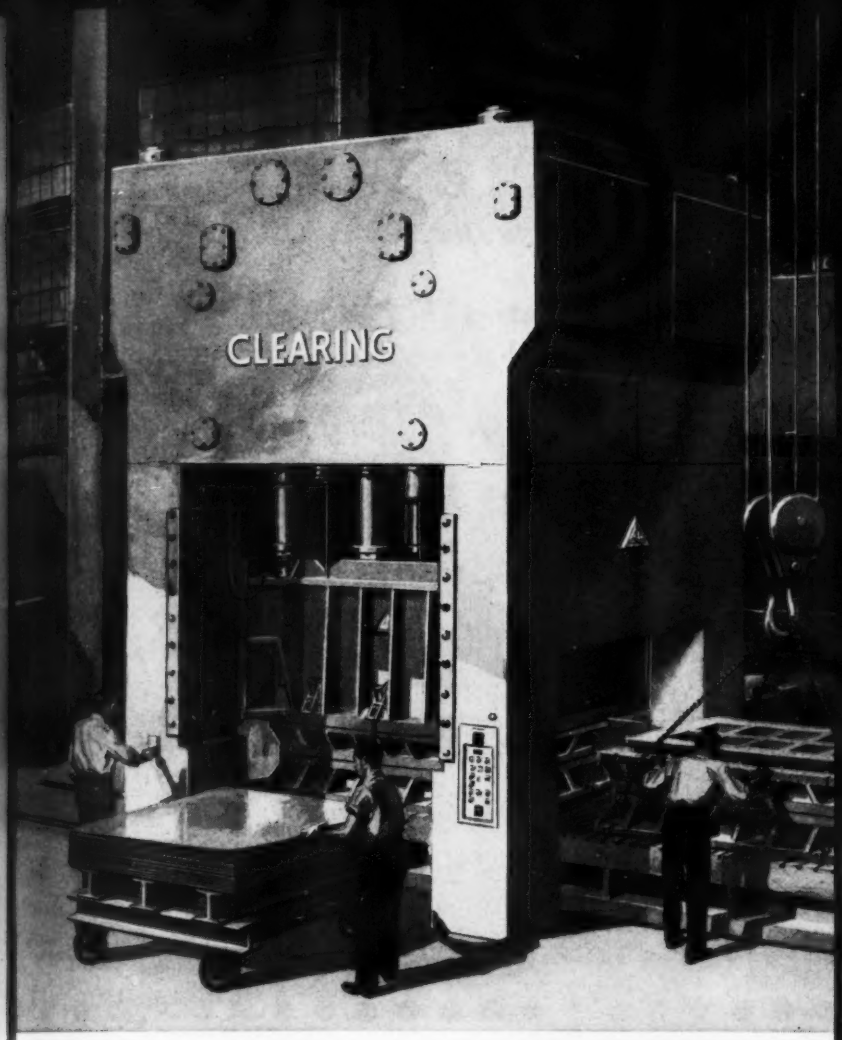
Write for free catalog with tracing templates provided.

NEWTON

NEWTON HYDRAULIC TOOLING COMPANY

AUBURN, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 36



WITH FASTER DIE CHANGING

Moving Bolsters—
faster die changing.

NOW CLEARING IS BUILDING THE MOST ADVANCED MOVING BOLSTER PRESS LINES EVER CONCEIVED

Clearing's Research and Development team has, for several years, pioneered concepts of press design to give press users undreamed of economies in manufacturing. Now, for the first time, these concepts are represented in features being built into several lines of presses in Clearing's plant.

These lines, similar to the illustration above, will reduce costs considerably because:

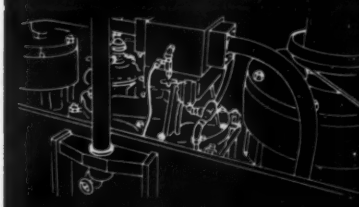
- MOVING BOLSTERS shrink die setting hours to minutes.
- AUTOMATIC SHUTHEIGHT CONTROL speeds adjustment and prevents costly and time-consuming damage to dies.
- 360° AUTOMATION LIMIT SWITCHES speed change-over from one production setup to another.
- HYDRAULIC OVERLOAD PROTECTION safeguards the press and dies thereby reducing down time.

Find out how the many cost-shattering features of this line can benefit YOU. Write for bulletins on Moving Bolster press lines.

Clearing division of U.S. Industries, Inc. manufactures Torc-Pac presses, hydraulic presses, Clearing-Axelson and Clearing-Harrison lathes, dies and special tooling, and special equipment for the aircraft and missile industry.

360° Limit Switch
speeds changeover time.

Automatic Shutheight Control
speeds adjustment, increases accuracy



Hydraulic Overload Protection
increases safety

USI Clearing

DIVISION OF U.S. INDUSTRIES, INC.
6499 W. 65th Street, Chicago 38, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 37

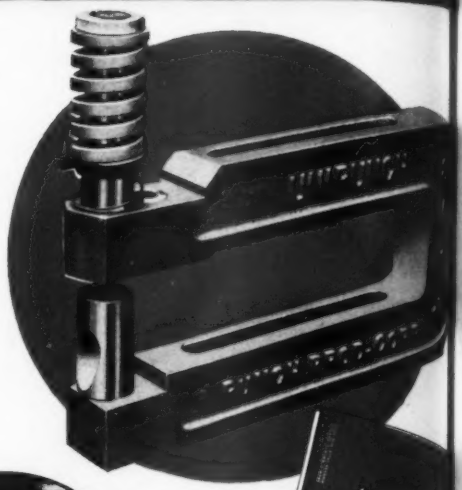
NOW

FOR THE FIRST TIME
REAL INTERCHANGEABILITY
IN UNITIZED TOOLING

NEW UNIPUNCH "AJ" Series provides not only INTERCHANGEABILITY with UNIPUNCH Series "A"—but also with units and parts of other leading manufacturers!

In keeping with the UNIPUNCH Series "A" Hole Punching and Notching Units this new UNIPUNCH "AJ" Series has the popular "standard" 8⅜" shut height, 3½" die height and the same maximum capacity of ¼" thick mild steel permitting all these Units to be used in the same setups.

All-steel cast holders produce longer life by combining higher tensile strength and longer wear plus greater bearing surface for punch guides than previously available in this type of holder.



USING PEDESTAL DIES Pedestal Die design is ideal for punching holes in angles, extrusions, channels and formed parts with lips or flanges. Slug chutes in these Pedestal Dies may be directed to prevent piling up of slugs—an important feature in making setups for punching a cluster of round or shaped holes.

USING DIE ADAPTERS UNIPUNCH Type "AJ" Hole Punching Units with Die Adapters provide inexpensive Die Button replacement plus quick, easy interchangeability of standard low-cost die buttons—same as used in UNIPUNCH Type "A" and "B" Hole Punching Units.

WRITE FOR CATALOG "AJ" TODAY

UNIPUNCH®

10 TON AIR-HYDRAULIC PRESS

UNIPUNCH PRESS with UNIPUNCH TOOLING punches holes in sheets, angles, channels and extrusions plus notching operations...more economically and more efficiently.

Only UNIPUNCH PRESS has ALL these *features:*-

Exclusive (pat. applied for) hydraulic control provides self-adjusting, self-compensating power stroke with positive stop automatically determined by punch break through in metal, eliminating close ram adjustment when punching various thicknesses of material. Removable ram nose or cap on press ram permits use of detachable vee dies, marking heads and short stroke die sets for small bending and marking operations. Ram can be jogged by foot control.

Simplicity of design (air-hydraulic) • Minimum of moving parts • Operates at 10 tons from 75 pound air line pressure • 100 strokes per minute • 1⅞" ram daylight adjustment • Foot operated control • No double stroking • 15½" throat depth without gauging • Gauging from center of ram to left 24" and front to back 12" (punches to center of 24" sheet) • Gauging equipped with 7 adjustable stops — Optional gauging over 24" available.

WRITE FOR CATALOG 1012 TODAY

UNIPUNCH® AT NATIONAL METAL EXPOSITION Nov. 1-4, Detroit, South 1566

UNIPUNCH®

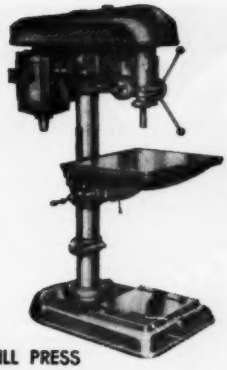
PUNCH PRODUCTS Corporation

3804 Highland Ave., Niagara Falls, New

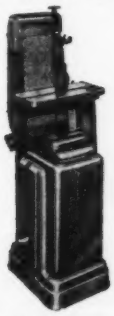
CIRCLE INFORM-A-GRAM KEY NO. 42

7" GRINDER
Also 6" Tool Grinder, 6" Bench Grinder

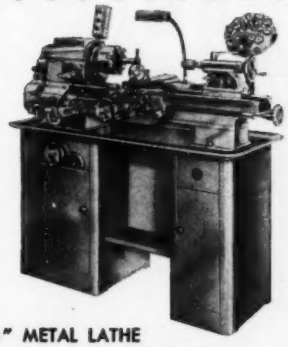
14" METAL-WOOD BAND SAW
Also 20", 14" and 20" Wood



17" DRILL PRESS

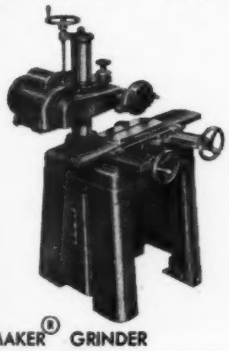


6" ABRASIVE BELT FINISHING MACHINE
Also 12" Disc, 2½" Belt Grinder

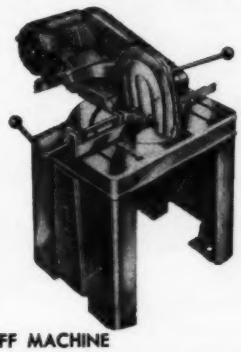


11" METAL LATHE
Also 10" and Hand Screw Machine

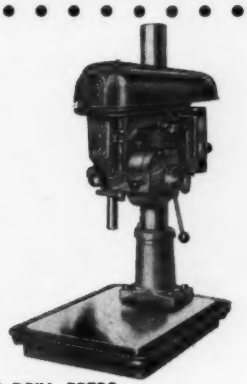
15" DRILL PRESS
Also 14" and 14" Super-Hi Sensitive



TOOLMAKER® GRINDER
Surface, Chipbreaker, Tool and Cutter



CUT-OFF MACHINE
Wet & Dry Abrasive, Non-Ferrous & Wood



20" DRILL PRESS

DELTA INDUSTRIAL TOOLS

a proved way to cut metalworking costs

You can match the tool to your job for bigger savings—supplement or replace expensive, special-purpose machines—when you choose from the world's most *complete* line—53 Delta machines, 246 models, over 1300 accessories. Delta tools cost less to buy, less to operate, and less to maintain. They offer precision performance to meet exacting requirements even under rugged, production-line use.

And because you can combine standard Delta components with automatic control devices, you can have the money-saving advantages of automation at a fraction of the usual cost. Ask your Delta Dealer about Delta "lo-cost automation"—and see the complete Delta line of tools and accessories—he's listed under "TOOLS" in the Yellow Pages.

FREE—Delta Industrial Catalog

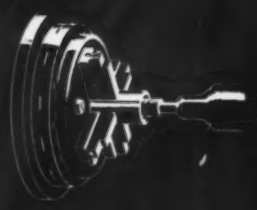
Get all the facts on the complete line of Delta metalworking and woodworking tools and accessories. Write: Rockwell Manufacturing Co., Delta Power Tool Division, 622K N. Lexington Ave., Pittsburgh 8, Pennsylvania.

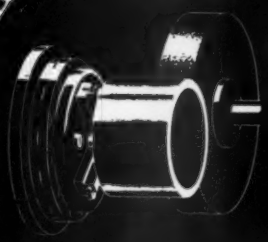
DELTA INDUSTRIAL TOOLS
another fine product by
ROCKWELL

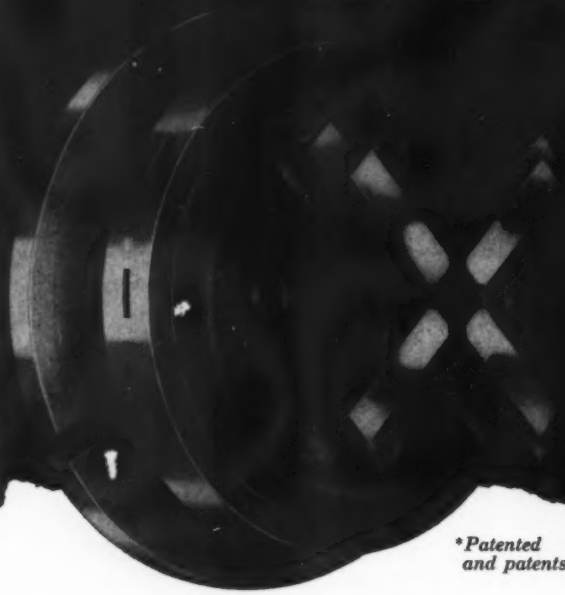
CIRCLE INFORM-A-GRAM KEY NO. 39

New ERICKSON Air Operated or Manual DIAPHRAGM CHUCKS

for utmost accuracy and concentricity







√ *greater jaw rigidity*

√ *internal or external chucking*

√ *easy diaphragm replacement*

√ *eliminates air leakage*

**Patented and patents pending.*

Basic design of new Erickson Air Operated Diaphragm Chucks* offers distinct advantages in three important areas:

Higher Production Speeds. Reduction in weight over conventional designs means lower inertial forces. Reduction in overhang reduces centrifugal forces; cleats provide sufficient counterbalance. Conventional compression-type adjustment for locating jaws gives greater jaw bearing and maximum rigidity for highest speeds.

Precision Performance. Traditional Erickson precision design and construction for utmost accuracy and concentricity.

Lower Maintenance. Diaphragm construction, with hold-down screws located on flat outer edge of diaphragm, reduces stress concentration and eliminates need for clearance holes through diaphragm for mounting bolts. Design gives higher yield point for diaphragm longevity and easier replacement. O-ring seals eliminate air leakage. Sludge slots around periphery promote escape of grinding dust and other maintenance-causing particles. AA-9506

Write for your free copy of "Erickson Air Operated Diaphragm Chuck" today.

ERICKSON TOOL COMPANY

34451-10 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • EXPANDING MANDRELS • AIR-OPERATED CHUCKS • FLOATING HOLDERS • TAP CHUCKS
AUTOMATIC INDEXING • MASTER SPACERS • DIAPHRAGM CHUCKS • PUSH-ON ARBORS • QUICK-CHANGE HOLDERS
EXPANDING COLLETS • END-CLAMPING CHUCKS • AIR CYLINDERS (allowing stock to pass through)
EXPANDING JAW MANDRELS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 40

AN EDITOR'S TRIBUTE TO

THE DIE DESIGNER-MAKER

MORE AND MORE we are dealing with highly sophisticated machines, methods, and materials.

Numerical control, spark machining, ultra-sonics, explosive forming, man-made diamonds, electronics, are but a half-dozen of today's familiars which were strangers in our midst a few yesterdays ago.

Consequently, we are too prone to develop a rather hard-shelled immunity, in the form of a lack of true appreciation, to the full significance and vital importance of older, long-established practices and techniques.

Embodied are machines, tools, methods, and skills, the lack of which would reduce our living to a pretty sorry state of affairs.

We are referring to the stamping press and its related tooling, and, most importantly, to the ingenious man who is responsible for giving us the material benefits of press production—the Die Designer-Maker.

Look away from this page for a minute. How many objects did you see within a radius of fifteen feet which came into being as a result of the know-how and skills of a Die Designer-Maker?

Working, playing, eating or sleeping, your twenty-four hours are spent in amazing degrees of dependence upon stamped metal products. Hard to believe? Just name the dozen nearest to you and imagine having to do without them! Pretty bleak outlook, what?

The stamping press is a big, noisy, often dirty, brute of a machine tool. But it is sensitively—even delicately — capable of repetitively concentrating a force of many tons upon the die which occupies its innards.

The die, by virtue of its Designer-Maker's applied skills, imparts to an otherwise flat and inert piece of metal three-dimensional shapes and functions ranging from the simplicity of a washer to the intricacy of a razor blade magazine.

The press and die team produces metal parts—even complete products—at a rate and cost advantage unapproached by any other concept of mass production.

Our Die Designer-Maker is unquestionably Industry's most unique and complete combination of METALLURGIST, ENGINEER, COST ANALYST, INVENTOR and MASTER CRAFTSMAN. All of him is embodied in each and every die he creates.

As he studies a drawing or prototype of the piece his die is to produce, and envisions the structural behavior (and misbehavior) of the metal when being bent, drawn, stretched, gathered, or pierced, he is a METALLURGIST.

In deciding what punch and die clearances are necessary in relation to the metal's thickness—what work can be performed at each station in a progressive die—what press tonnage is required to do the job—and at what speed—he is an ENGINEER.

He draws upon his experience and skills to plan the placement of cutouts—to decide whether to feed coiled strip or sheet stock into his press—to determine the most economical number of stations or operations—to combine operations so as to eliminate secondary operations and re-handling of the workpiece—and to end up with an irreducible minimum of scrap. Here, he functions in his capacity as COST ANALYST.

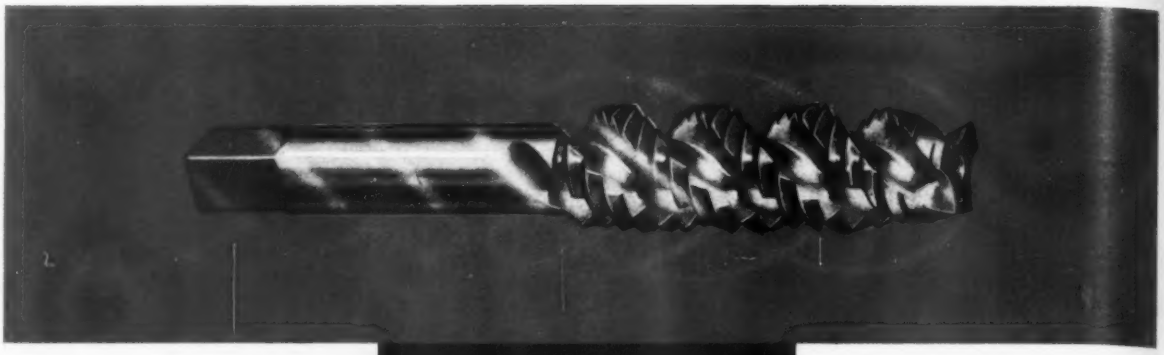
When he comes up with an ingenious, high-speed, repetitively accurate die, different from any ever made before, and which turns out a workpiece unlike any ever made before, or a die which produces a previously-made workpiece but does it better, faster, and at lesser cost in material and scrap, he is most certainly, and of necessity, an INVENTOR.

Finally, when he sets forth to build and/or supervise the building of his die—utilizes the capabilities of today's precision machine tools—works to tolerances far finer than those prescribed for the pieces to be produced in the die—and finishes its sections and surfaces to jewel-like perfection—he thereby demonstrates that he is truly a MASTER CRAFTSMAN.

We hope that this recognition of the Die Designer-Maker as one of Industry's most indispensable men may also serve as a bit of inspiration to today's young metalworkers who are apprenticed to this select fraternity of artisans.

E. Willard Pennington

Editor



TURBO-CUT

the tap that's changing the meaning of "high production"

The reports we're getting from our field men on Turbo-Cut Tap performance are self-explanatory.

Here's a sample from one day's mail:

"This tap was run on an aluminum carburetor part and started to run undersize after 32,160 holes."

"We currently have a 5/16-24 Turbo-Cut that is still going after 18 shifts and over 43,000 holes."

"A #10-24 Turbo-Cut plug tap ran 18,200 holes on a zinc die cast job."

Threadwell's Turbo-Cut is piling up records like these daily. Every plant interested in increased production should take a look at the tap that really means "high production". See your threadwell Distributor now for details.

Only Threadwell makes the genuine Turbo-Cut.

Threadwell
MAKES THE BEST PRODUCT BETTER

INDUSTRIAL DISTRIBUTORS
THE RIGHT HAND OF PRODUCTION

THREADWELL TAP & DIE CO.
GREENFIELD, MASSACHUSETTS

Stocking Warehouses: New York — Cleveland
Detroit — Los Angeles — Greenfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 42

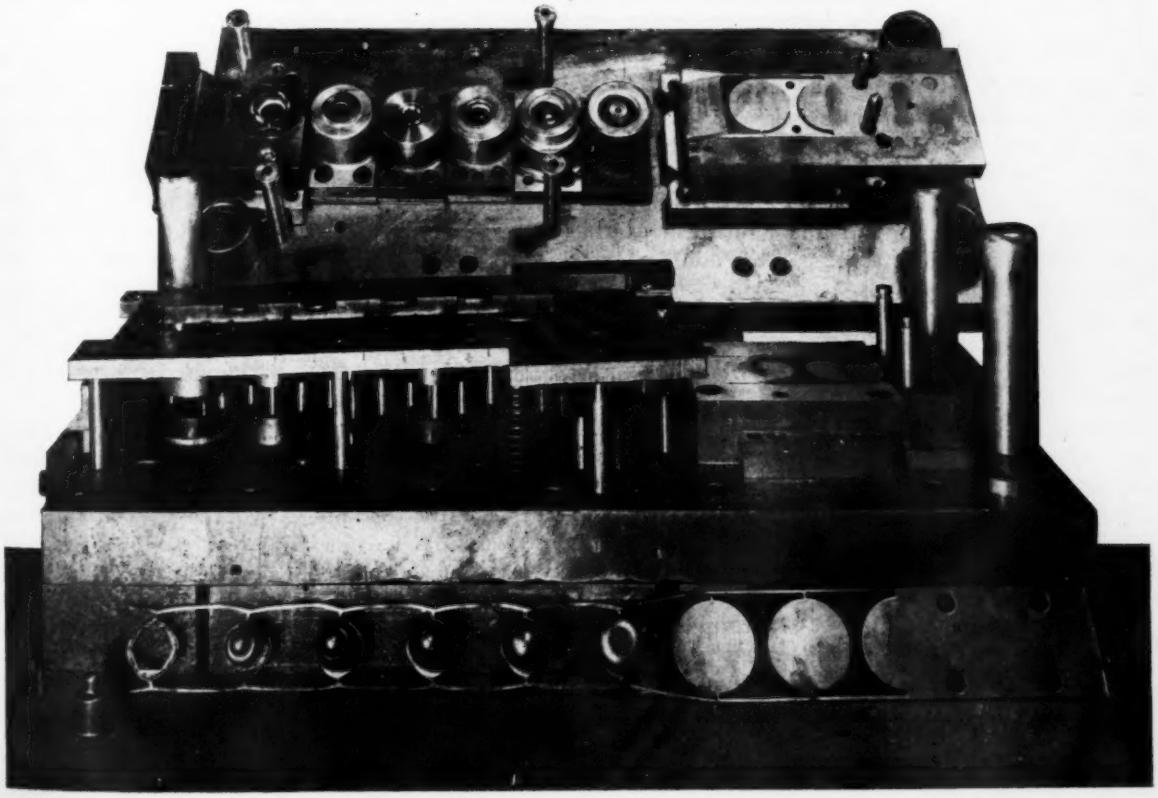
Caught Short for A Die?

Build It Backwards . . . if you must

by William E. Hoffman
Associate Editor

This is about A TOUGH STAMPING JOB — accomplished in spite of difficult circumstances. These circumstances included a lack of adequate lead-time that stymied a conventional approach to the design and build of the die. But, there was a way around this. Although the method used was frustrating it met the customer's demand for pieces in a hurry, and Ed Stealey's demand for a high production profit-making tool. Mr. Stealey is Chief Engineer at Boehm Pressed Steel Company, Cleveland, Ohio.

Fig. 1. Here's the die out of the press and opened up. In the foreground is a check-strip, cut out of production, and a finished stamping.



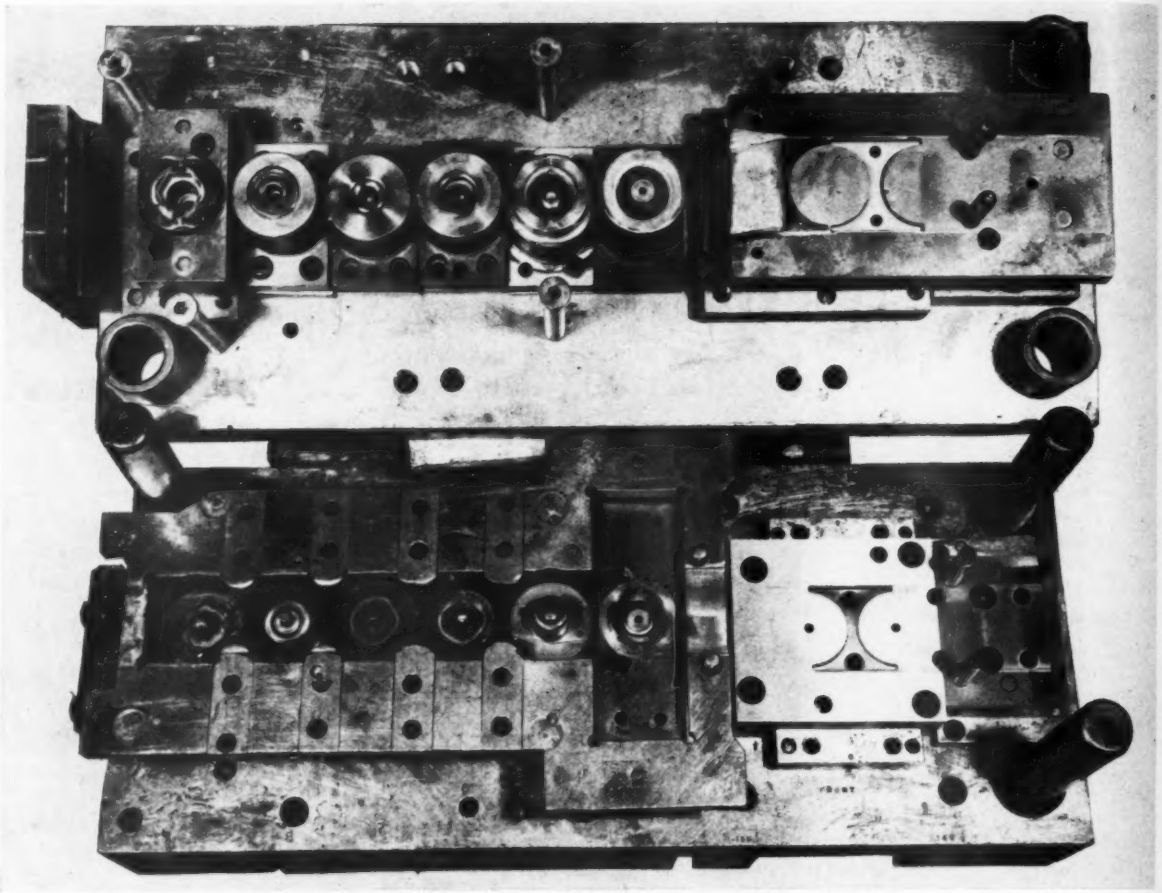


Fig. 2. Another view looking more directly into the die. It is difficult to detect the carbide inserts.

IF YOU DON'T OWN THE DIE and your source of stampings is suddenly terminated you're in a "tight." One of Boehm's customer's recently was in this position and turned to the firm for help. They needed stampings "right now," and making them became Ed Stealey's first concern. But there was another concern: He first had to make a die that would give the customer the hundreds of thousands of parts he would need in the future. A temporary die wouldn't do the job; yet, there was little time to build the high production tool he knew he must eventually have.

There was only one way out. He would have to build it backwards; that is, build a die to make parts as soon as possible and rebuild it as press downtime permitted. This doesn't sound difficult until the other factors are considered—the fact that reduction from blank through the final cup was severe; the available press didn't have enough ram width to allow the use of the proper number of stations; there wasn't time for the immediate application of carbide; and, feast or famine, these things always happen when too many other jobs are going.

Since the press available was small, with insufficient pressure area, it was decided to design and build without benefit of register pins. This would also save some build time, so he figured to get into production by using register supplied by the strip feeder. It worked well enough in the pinch but took careful watching in order to shut down in time for register correction necessary to protect the die and production. Actually the operator monitored the die with a micro-switch in hand. At 40 strokes/min he was able to see trouble developing, and once started it developed fast. He had to be attentive because of the press' positive three position clutch, which would allow drift before stopping. Automatic overload shutdown features had to be left off.

The strip feeder, still being used, operates on a pneumatic stroke-hydraulic clamp principle. It worked well at the start of the run (without register pins), but for a draw like this pressures eventually took the strip away from the clamp. Once a few thousandths out of register, register would become progressively worse, as would die wear.

In building the die, Ed's prime

objective was to develop the draw ring configurations first. So with a blank diameter of 2.220" and a 2.500" station-to-station progression the number of stations was soon established. It was immediately obvious that not enough were available for conventional reductions. This forced quite a bit of button development — running free. The main objective here was to get enough area and thickness for second operation threading.

When stamping under such unusual conditions all the help available is needed, so an aluminum "killed" 16 ga mild steel was used. With this steel, uniformity from one run to the next would be assured.

It was planned to do the development work and if space permitted, add helping stations later. As it turned out, by bolt-on additions to strengthen the die, he was able to add a punch station for pilot holes and one for register pins. Complete reduction was accomplished in five draw stations — although the reductions from station to station were not "according to the book."

At Draw Sta. 1 a nominal 46% reduction of blank diameter was used; no problem was experienced except die wear due to the absence of carbide. This was soon corrected by the addition of carbide ring inserts in the original high carbon-high chrome draw rings after annealing.

In the beginning, before carbide was used, Ed says they went out of tolerance easily when a little wear showed up. This changed reduction percentages from station to station. So, correcting for wear at one station caused a change at all stations.

It is interesting that they found the use of inserts of Ferro-Tic, a titanium carbide, very helpful when applying carbide. The die could not be out of the press for any length of time for rework, and by using this they were able to realize much faster

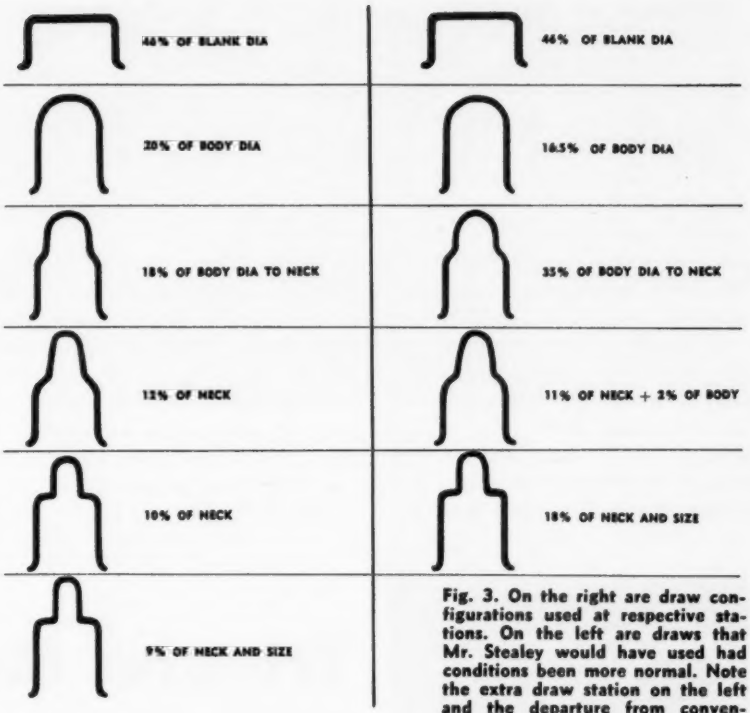

46% OF BLANK DIA
20% OF BODY DIA
18% OF BODY DIA TO NECK
12% OF NECK
10% OF NECK
9% OF NECK AND SIZE
46% OF BLANK DIA
16.5% OF BODY DIA
35% OF BODY DIA TO NECK
11% OF NECK + 2% OF BODY
18% OF NECK AND SIZE

Fig. 3. On the right are draw configurations used at respective stations. On the left are draws that Mr. Stealey would have used had conditions been more normal. Note the extra draw station on the left and the departure from conventional percentages in reduction figures on the right.

carbide application — Ferro-Tic being machineable and heat treatable.

Although the comparison diagram (Fig. 3) shows 20% as a normal reduction at Draw Sta. 2, the 16.5% reduction was necessary to keep the top of the cup from thinning out. As mentioned before, this was important to maintain wall thickness at the neck for subsequent operations. A greater reduction would have brought the body too close to size, or under size. It would seem that the reduction load could be more evenly divided between these first two stations but work hardening had to be considered after each draw.

Draw Sta. 3 is **the** one—a 35% reduction to neck. According to normal practice this should have only been 18%. There is no reduction on the body here, but all the holding power possible was employed through spring pressure crowding. Even so, some body distortion was experienced and had to be taken out at the next station.

According to proven practice a 12% neck reduction should have been used at Draw Sta. 4, but Ed only took 11%. This was due to the two rates of flow that were planned into this station. He had to get rid of the body distortion from Draw Sta. 3, and did so by a 2% body reduction. This also retarded further distortion. Actually the final ID is held to a total tolerance of only 0.003" so sizing consideration began here. After sizing, the ID is a planned 0.001" undersize.

In Draw Sta. 5 the final OD of the neck is formed by an 18% reduction. This is actually a swaging operation since no internal support is used. A final sizing of the body takes place simultaneously.

Reduction in the last draw station should really be done in two stations, in which case 10% and then 9% would have been used.

If you question these reductions, consider the fact that Mr. Stealey has turned out some half million good stampings with them. In Figure 3 the usual (book) reductions and those actually used are compared.

Of course Ed admits that he could get approximately 25% more life out of the last two station die components were he able to add a station in between. Added die life would come about by not necking the top and sizing the body at the same time in the fourth draw station. Then too, an added station would relieve the combination of drawing and swaging in the fifth.

It would also have been desirable to have an extra idle station between the "dogbone" cutout and the first draw. This would have distributed the stretch in the carrier strips between the idle station and the first draw. Actually, as is, there is not enough stretch and the strips pivot from the idle station tabs to the first draw tabs. This shortens up the register length a thousandth or so. Out of register, however slight, causes excessive wear on the draw members.

At the time of this writing the die has progressed towards its final design and physical arrangement. It is now a relatively trouble-free tool. But, the final accounting is not in. There is talk of production warranting a new and larger press which will accommodate those extra stations Ed could have used. end

Fig. 4. The finished part showing the hole in spigot and threads. The hole could have been punched at the same time the part was sheared out of the web, but here again limitations: The die was designed for a 110-ton press which already had special adaptions for it. Without piercing this hole Ed had already worked to the extreme tonnage limit.

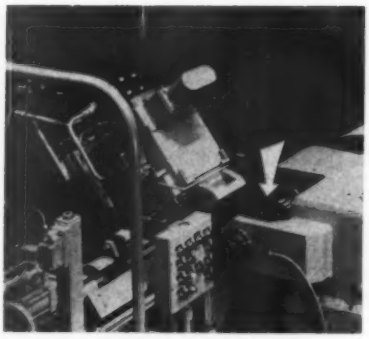


Fig. 1. Clamping mechanism.

Transfer Machine Uses New Methods For Unusual Part Design

NEW TECHNIQUES FOR HANDLING and machining crankshaft bearing cap clusters are being used in a 30-station Cross Transfer-matic built for a European auto manufacturer. Operations performed include milling, drilling, reaming, forming, and sawing. Output is rated at 436 caps/hr.

Unlike U. S. designs, European bearing caps require several operations on the end caps, so a new processing method is used: The cluster is transferred and machined with the centerline at right angles to the direction of the transfer movement.

Another innovation is in the processing of bolt holes. In the sawing station, locating pins are placed in all of the bolt holes to hold each cap securely during sawing and to prevent movement of caps after they have been cut into individual pieces. Clearances between the locating pins and bolt holes are critically important since the slightest movement of the caps pinches the saws as they withdraw from the work, causing breakage of carbide tips. By drilling and reaming bolt holes from the side opposite the joint face, wander from drills ground slightly off center does not affect hole center distances where the locating pins enter them.

A new gang sawing unit, part holding fixture, and material handling device have been developed for presenting the cluster to the sawing station, holding the cluster during machining, and for cutting the cluster into four individual pieces.

The horizontal way-type sawing unit uses a special gang milling cutter head which is mounted on a single arbor powered by a 40-hp motor. An hydraulically powered clamping mechanism (Fig. 1) mounted on an angular base opposite the sawing head (at arrow in photo) holds the cluster on a 40° angle. This provides ample room for chip clearance and minimizes milling head overhang.

Since the sawing unit faces into the left hand side of the machine with the cutter arbor at 90° to direction of part flow, a unique material handling mechanism is used to properly orient the part and locate it in the sawing station. After the last machining station in the machine, a combination transfer and turnover device clamps, lifts, and rotates the part and then sets it

down onto a shuttle-transfer bar mechanism where it is pushed laterally to the sawing fixture.

Processing

In the sequence of operations, parts are received with the bearing face and joint face finish broached. The cluster is loaded into the machine with joint face down, No. 1 bearing to the left hand side.

In Stations 3, 4, and 8, drilling, chamfering and tapping operations on the end of the block are completed by horizontal units. Bolt holes are drilled, reamed, and spotfaced in Stations 3, 4, 7, 8, and 9. Final operations on these holes are performed at Station 21 after the part has been turned over.

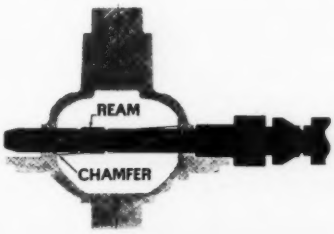
At Station 12, a horizontal single-spindle milling unit on the left hand side face mills the back side of a lug on the No. 1 bearing cap. Simultaneously, a cross-facing unit generates two felt seal grooves on the No. 4 bearing cap. A felt seal groove on the No. 1 bearing cap is machined in two steps by a combination cross-facing unit at Stations 15 and 17. Following 180° turnover of the cluster from Station 19 to Station 20, (Fig. 2), a way-type combination vertical drilling and gang milling head chamfers all eight bolt holes on the joint face side and mills anchor lock notches in all four bearing caps at Stations 21 and 22.

Fig. 2. Combination drilling-milling head.

After two oil slinger grooves are milled on the No. 4 bearing cap and both sides of the bearing diameter of the No. 2 cap are chamfered at Station 25, the part is turned over 140° from Station 28 to Station 29. The turnover mechanism lowers the cluster onto the shuttle-transfer bar mechanism with the joint face down. The cluster is then shuttled to the final station where it is clamped and sawed into four separate bearing caps making up one complete set. As the shuttle-transfer bar carries the cluster into the station the bar simultaneously unloads the preceding cluster into an unloading chute. end

Timesaving Tool Reams and Chamfers

Three operations are combined into one with a special Cogsdill tool, which in one pass reams the entry hole and makes two hidden inside chamfers on differential cases at Ford's Sterling Township plant. Machining time has been cut 65% with a substantial increase in production.



The differential case and cover (Fig. 1) are joined and a slave pin hole drilled before hole finishing, which necessitates chamfering internally and reaming the entry hole, all from the outside of the case. As the tool enters the case (Fig. 2) four carbide-tipped reamer blades ream the hole. When the tool is compressed against the part a cam pin swings out a double-ended carbide-tipped blade to chamfer both inside holes.

A fixture (Fig. 3) guides the differential case into the tool. The operator loads it and in one easy motion the operation is completed. Made by Cogsdill Tool Products, Inc., the tools are changed only after 5000 to 6000 parts have been run.

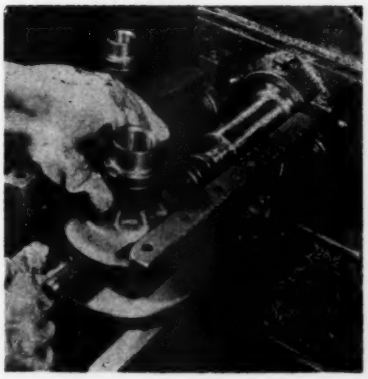


Fig. 1. Electric furnace produces a heat of alloy steel for die blocks and forgings in 4½ hrs.

Vacuum Process for Die-Block Steel

NEWS OF CLEANER, TOUGHER STEEL for die blocks and forgings is sweet music to the ears of metalworking. A real earpleaser, then, is the new vacuum degassing process which removes hydrogen from molten steel after it has been tapped from the furnace into the ladle.

Reduction of the amount of hydrogen gas in steel means improved service life for forged and machined parts, since hydrogen has been shown to cause flaking and small cracks. Removal of oxygen and nitrogen, also accomplished in the vacuum ladle process, results in a cleaner, better steel.

For years various heat treating methods have been used to reduce hydrogen content, but these processes are costly and time consuming. Flaws often show up after weeks of labor in forging and machining, and then the product has to be rejected.

In the process developed by steelmakers A. Finkl & Sons Co., a heat of steel is made in an electric furnace (Fig. 1) and tapped into a pouring ladle. The ladle is then placed inside a large vacuum degassing chamber (Fig. 2), and the cover is put in place. Then the degassing cycle begins. Four steam ejector suction pumps are turned on in proper sequence by automatic controls. The air inside the chamber is drawn out, creating a high vacuum condition inside.

As the vacuum is achieved the harmful hydrogen gas in the steel bubbles to the top and is drawn out of the chamber. Oxygen and nitrogen also bubble up and out. Helium gas is added to the ladle during the process to increase the vacuum removal of unwanted gases. Finkl's tests indicate that 60% of the hydrogen is removed in the process, which only takes 12 min.

After degassing, the steel in the ladle is poured into one or more molds. When the ingots solidify they are reheated, forged, and fabricated into custom forgings and die blocks for tough metalworking jobs. end

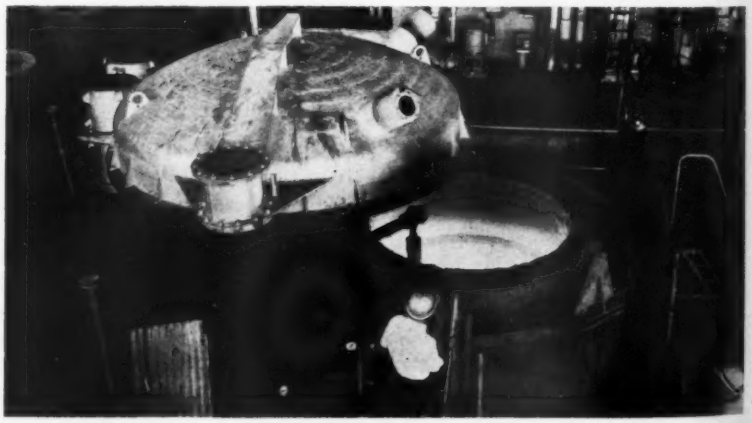


Fig. 2. Ladle of molten steel is degassed in Finkl's vacuum chamber. Its top swings to the side after unwanted gases are removed by vacuum.

Stainless Steel Sheets Become Water Softener Tanks By Shearing--- Punching--- Rolling--- Welding--- and Polishing

IN TURNING STAINLESS STEEL SHEETS into water softener tanks, General Ionics Corporation, of Pittsburgh, Pa., utilizes many interesting fabricating techniques. The company manufactures a complete line of water softeners for the home, trade-named "Ever-Soft."

General Ionics claims "neither the chemical properties of water nor the regenerating brine can in any way damage the softener." The company backs up this promise with a warranty recently extended to 20 years, after the tanks outlasted their original 10-year guarantee against rust and corrosion.

To produce a water softener that outlasts years of rough service, General Ionics uses stainless sheet, much of it supplied by Allegheny Ludlum Steel Corporation, that has been cold rolled to impart a smooth, dense surface. This smooth surface eliminates any possible contamination, an important factor in connection with drinking water. The type 302 stainless sheets, 18 gauge, are also temper rolled on an Allegheny Ludlum skin pass mill to provide a bright finish.

Stainless steel sheets, supplied in 36" x 96" size by Allegheny Ludlum Steel Corporation, have already been cut to 36" x 48" in this picture. Type 302 sheets, 18 gauge, are cold rolled to impart, smooth, dense surface, and temper rolled on a skin pass mill for a bright finish.

Additional slice reduced 36" dimension to 35⅛", leaving ⅞" strip which is used later to back up the tank's center weld. Sheets, packaged 200 to a skid, are cut on this pedal-actuated Pexto shearer, powered by a 3 hp motor. This is the first production step of General Ionic's water-softener tanks.

The first step in production is to trim the sheets, which are packaged 200 to a skid, from 36" x 96" x 48", providing 400 finished tanks from 200 sheets. The 36" width is then cut to 35⅛", leaving a ⅞" strip which is used to back up the tank's weld seam.

The sheet is carried to a Lang punch press, where two holes, each 1-1/16", are punched to make room for the tubing and valve assembly.

After the sheet is cut to proper size and punched with two holes, it is rolled into proper diameter on a Pexto roll. General Ionics makes two standard size tanks, and five separate models. General Ionics can fabricate vessels up to 94" diameter, and stainless up to 3" thick.

This cylinder is tack-welded at three points, using a type 308 stainless, 3/32" titanium-coated rod. After tack-welding, the tank is placed on a Linde submerged arc, automatic welding machine, for the important center weld. This machine, which operates at 25 volts and 280 amps has a capacity of 6' x 3'8". It welds at the rate of 40" min; the weld is constantly covered by Lincoln ST-100 flux, which travels in front of the welding point. Type 308 filler rod is fed from a variable-speed wheel.

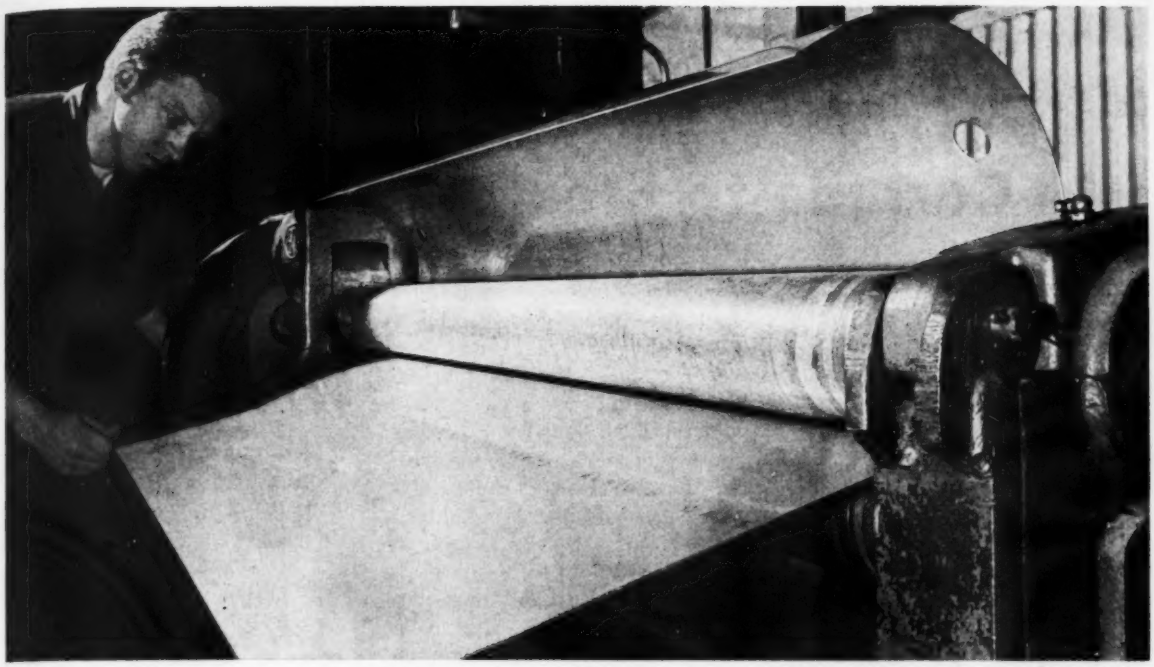
The sheet, now permanently shaped and fastened into a tank, is ready for the bottom and head. These are spot-welded onto the tank with a titanium-coated, type 308 stainless rod.

The weld seams are now buffed. The buffing abrasive, a special compound, is mixed to General Ionics' specifications.

The valve and its tubing are now assembled onto the tank. Valves are cast from copper and brass, and are either manual, semi-automatic or completely automatic. They regulate the flow of water and brine during the regeneration cycle. General Ionics performs an effective operation on the manual valves: the body and rotor are lapped and held optically to within two light bands to provide the flatness required.

Slotting a small seamless tube provided a unique problem which Allegheny Ludlum helped General Ionics solve. A tube to allow water to pass through

A punching operation puts two 1-1/16" holes in the sheet for the valve and sidearm assembly. Two men handle the sheet on the pedal-operated Lang punch press.



Rolling the sheet into a 11¾" dia cylinder takes only about five seconds on this Pexto roll.

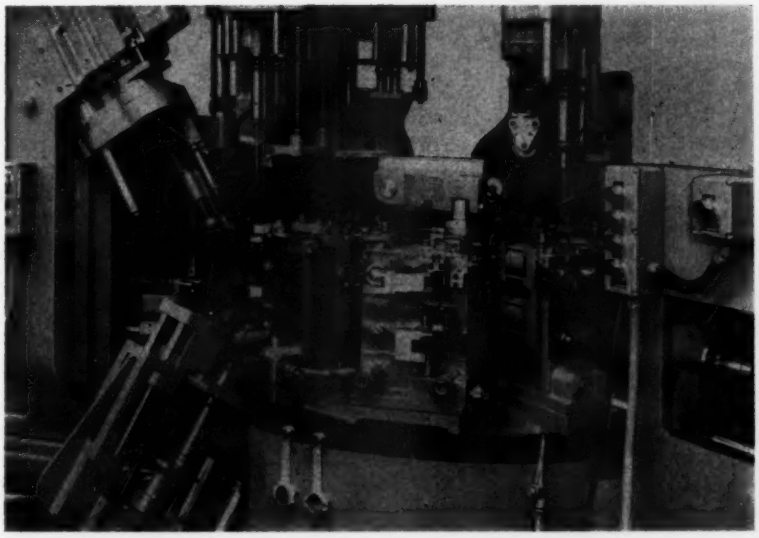
resins was specified for the bottom of the tank. Tubing of only 0.016" wall thickness, with an outside diameter of 0.875", was designed with 8 rows of 15 slots, each only 0.013" wide. Contamination and corrosion were important considerations. General Ionics solved the difficult operation with type 304 stainless, making 15 slots in one pass with a Walker-Turner radial slotter.

After the valve assembly is installed, the water - softener tank is completely fabricated and operable. It is hydrostatically tested at 150 lbs pressure for one hour to check for any possible flaws. Although the average household tank must withstand only 85 lbs pressure, a General Ionics water softener has withstood as much as 800 lbs pressure. The tank is then hand polished with a metal cleaner, packaged and shipped to the Ever-Soft dealer. end

8-Station Unit For 19 Operations

An 8-station machine performs 19 separate operations on forged steel connecting rods for outboard motors. Its special fixturing permits simultaneous machining of both sides and both ends of the part.

Flexibility is provided for by interchangeable fixture dial plates and by easily removable bushing plates. Wisconsin adjustable drill heads are used to change over from one size connecting rod to another in less than four hours. The machine, designed and built by the Wisconsin Drill Head Company, operates on a 25-sec cycle producing 144 parts/hr.



Powdered Metal Bonds Carbide to Steel

ECONOMICAL AND PRACTICAL USE OF CARBIDE tooling depends on successful bonding of carbide tips to steel shanks. A new bonding method, based on powder metallurgy techniques, has been reported

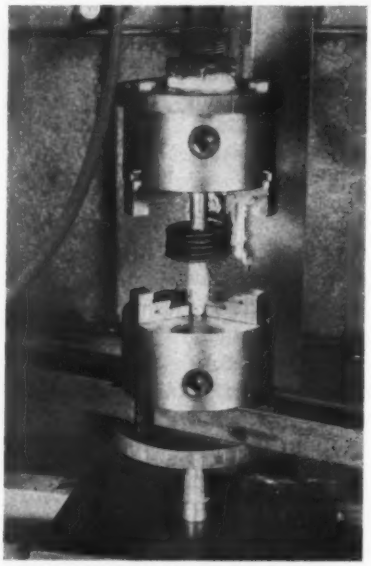


Fig. 2. Induction coil supplies heat, and press ram applies pressure through attached chuck to wafer-bond carbide tip and steel shank.

which promises to meet the need for dependable, strong, shock-resistant joints between carbide and steel.

Unlike other methods which use mechanically clamped inserts, adhesives, flame plating, or sandwich brazing, this Plymet bonding technique uses thin wafers molded from a metal powder mixture. After a sintering operation, the iron-nickel base, self-fluxing wafer is sandwiched between the carbide and the steel for the heat-and-pressure bonding operation.

In the bonding operation, a Plymet wafer 1/32" thick and slightly larger than the carbide tip is placed between the carbide and the steel shank, and the assembly is subjected to pressure of about 500 psi. Pressure is maintained while the joint is heated to a temperature of 1950°F, and held at temperature 30 secs. When the bonding temperature is reached, flux oozes out of the pores and coats the joint. Upon completion of bonding the tool is oil quenched.

The portion of the wafer covered by the carbide, and thus subjected to pressure, compresses about 15% to 20% in thickness, eliminating most of the voids and resulting in a joining metal hardness of about Rockwell C-45. Excess Plymet outside the carbide is not compressed and remains soft and friable, which makes it easy to remove by filing or sanding. Unlike brazing, the material does not melt during the bonding operation.

Simple Setup

In a setup for bonding carbide tipped test pieces, a 12-kw high frequency induction unit is used with the induction coil surrounding the carbide, wafer, and steel at the joint. Parts to be joined are held in alignment by lathe chucks (Fig. 2), which are centered with respect to each other on a small air press. The upper chuck, attached to the press ram, transmits pressure and holds the carbide piece while the stationary lower chuck holds the steel shank. The setup pictured was designed for long parts. Short

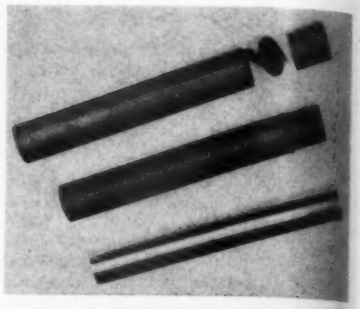


Fig. 1. Steel shank, wafer, and carbide tip (top) are bonded together (center) to produce finish ground carbide tipped punch (bottom).

tipped punches and similar tools would require only a simple pressure ram without guidance.

Strong joints in small lathe turning tools can be prepared simply by gripping the shank, wafer, and carbide tip in a vise between blocks of insulating brick, and heating with an acetylene torch. Thus, small shops can prepare the wafer-bonded tools without purchasing elaborate equipment.

Reporting on this new bonding development at a recent Metal Powder Industries Federation meeting, Powder Alloys Corporation President Jerome F. Kuzmick also revealed that a punch bonded by the Plymet process had sized over a half-million sintered iron and bronze flanged bushings without appreciable wear. end

Fig. 3. Bonded punches prior to grinding and hardening. Ring-shaped wafer was used on punch at left; filing removed excess between teeth.

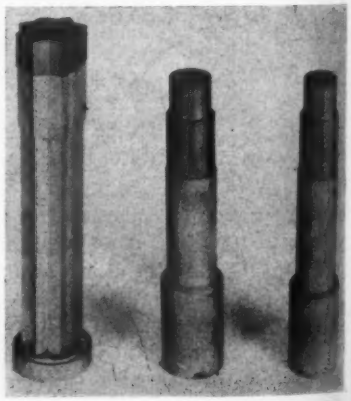


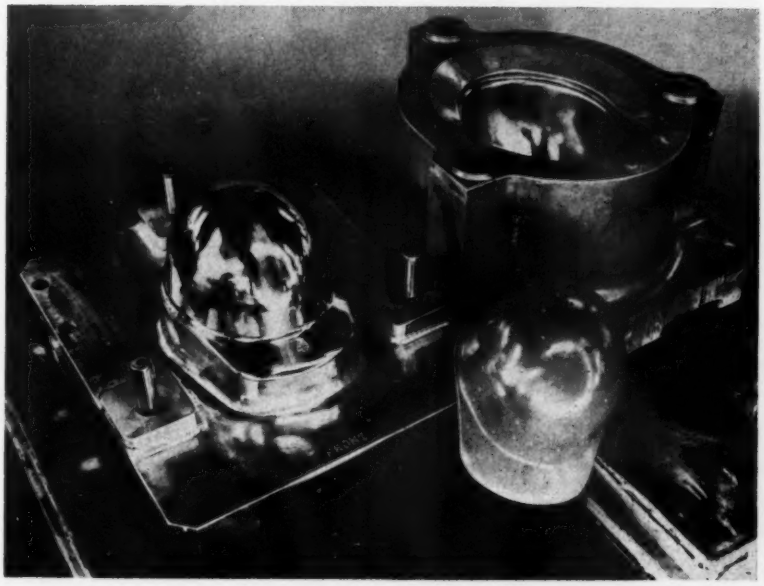
Fig. 1. A flame hardened plastics molding die. Dotted lines point out the areas receiving most severe abrasion. These have been flame hardened.

Flame Hardened Dies

by Stewart M. DePoy

TWENTY YEARS AGO, when the styrenes and poly-esters were developed, plastics molds were "whittled" from some expensive steel. They were either heat treated to a machinable hardness or case hardened after finish machining. Although these

Fig. 2. Another selective flame hardened molding die.



Mr. DePoy is Metallurgist at Lakeside Steel Improvement Company, Cleveland, Ohio.

methods are still used, the manufacturers of plastics dies are relying more and more on cheaper materials which are ultimately selective hardened on the areas where abrasion occurs.

The molds shown in Figures 1 and 2 are forged from SAE 4140 steel billets; in forging they are double upset to obtain a dense homogeneous structure with oriented grain flow for maximum tensile. After finish machining the dies are taken to a commercial heat treater for selective hardening.

In general, most abrasion is at the "pinch off" or the edge of the cavity where great force edges the molded product. Sometimes, however, it is also necessary to harden some of the internal radii, where wear is excessive due to part ejection.

The flame hardening is accomplished by heating the surface only, and immediately quenching it. This requires specially designed heads used by experienced mechanics.

This method of obtaining hard die surfaces eliminates warpage. It puts hardness where it is needed and develops an excellent abrasion resistant surface. It has simplified the problem of design change since annealing, reworking and then rehardening, by this method, is safe and relatively simple compared to the old method of annealing and rehardening the entire die.

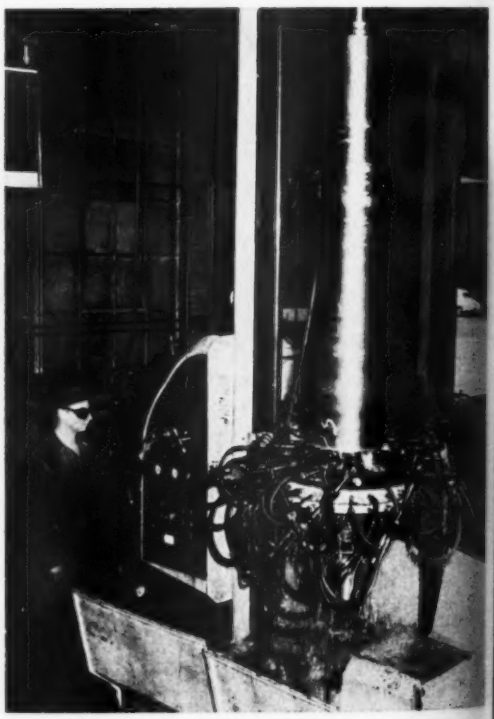
. . . Speaking of Flame Hardening

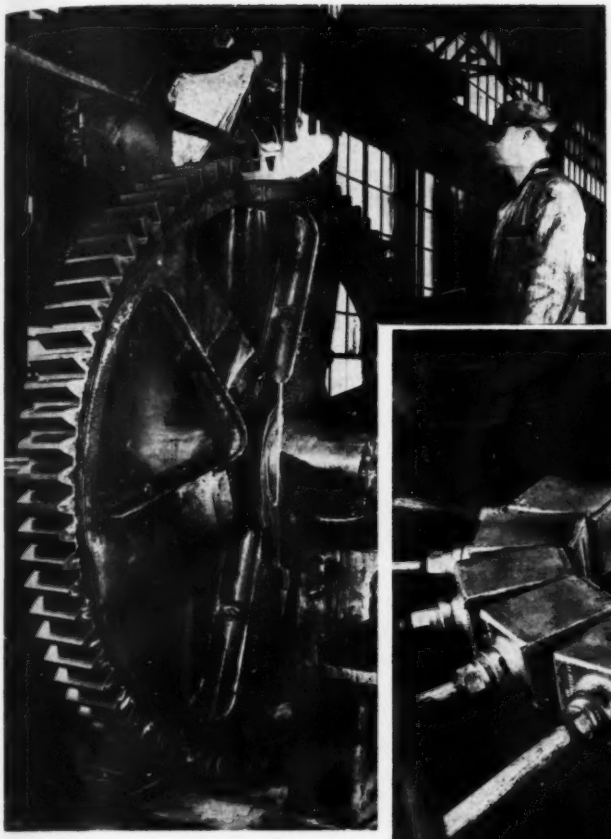
These pictures show fixturing and work in process

(Photos courtesy Lakeside Steel Improvement Company.)

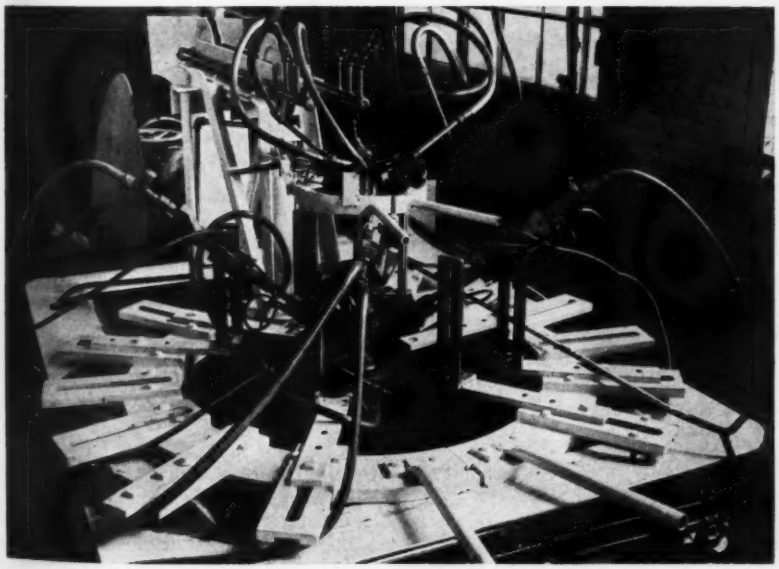
Fixturing here is difficult to see for the maze of oxyacetylene and water quenching tubes. Workpiece is a mill roll.

Hardening a steel mill valve component.





Two different approaches to flame hardening built-up gear teeth.



A universal flame hardening fixture adjustable for hardening circular work.

Rotary Swaging -- What it is -- What can be swaged

First of a Series

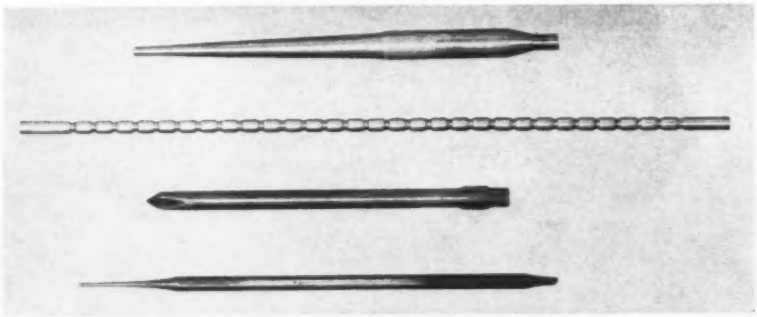
ROTARY SWAGING IS a type of fast forging, requiring little manual labor and power. In general, it is the changing of a large diameter to a smaller diameter with no loss of material. It can be used to shape round sections into irregular shapes, and to resize both ferrous and non-ferrous solid bar stock.

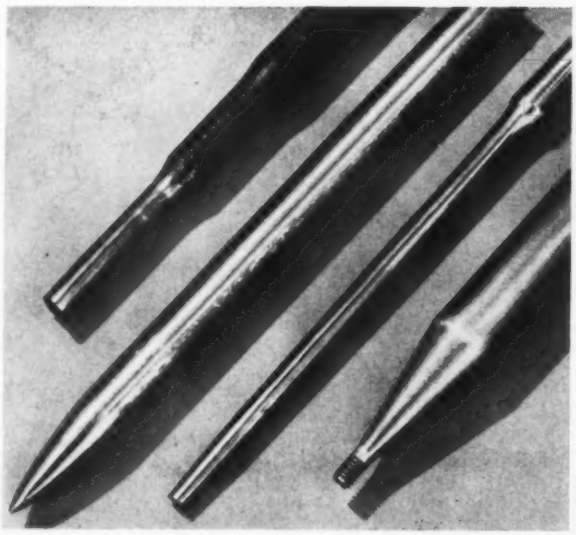
With a swager on hand, inventory costs can be kept to a minimum by taking large bars and reducing them as needed to smaller sizes, rather than stocking all sizes. It is cheaper to resize a bar this way than by chip-making processes — especially when costly alloys are used.

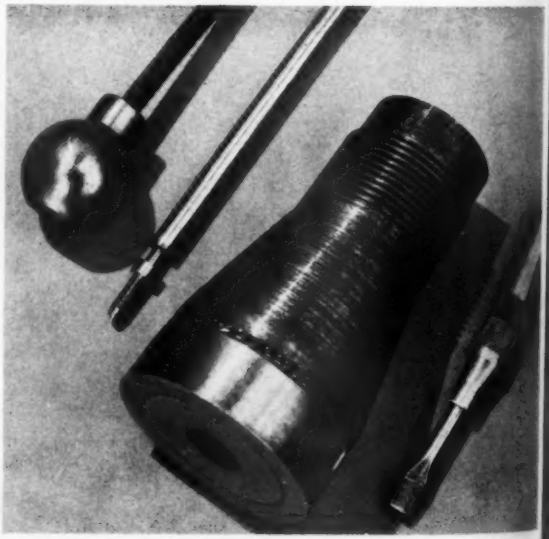
In operation, a forming die made up of segments, in multiples of two, is backed up by an equal number of hammers, usually held in a revolving spindle. The inertia of a flywheel drives the spindle which delivers a striking force as the hammer and die segments pass between rollers and the work. This causes reshaping in conformance to the die form. A centrifugal force throws the die and hammer segments outward between blows.

A swaging machine packs a mighty "wallop." To duplicate a swager's performance with a slower force would require a punch press or drop hammer with massive proportions. For example, a 1F swaging machine weighing 625 lb can deliver the equivalent of an 8-ton force, a 3F weighing 1900 lb can deliver approximately 75 tons of force, and a 6F weighing approximately 10,000 lbs can deliver 700 tons of force. Quite a ratio!

Swaging improves grain structure since reduction is by a great many relatively light blows that don't seriously disturb the metal's molecular arrangement. This allows a smooth flowing rearrangement of grain. It is possible, in fact, to swage material of a fragile crystalline structure to a point where it will become ductile enough to withstand severe bending. Swaged pins and punches, it has been found, may have many times the wear life of a machined part due to this grain refinement and increased density.

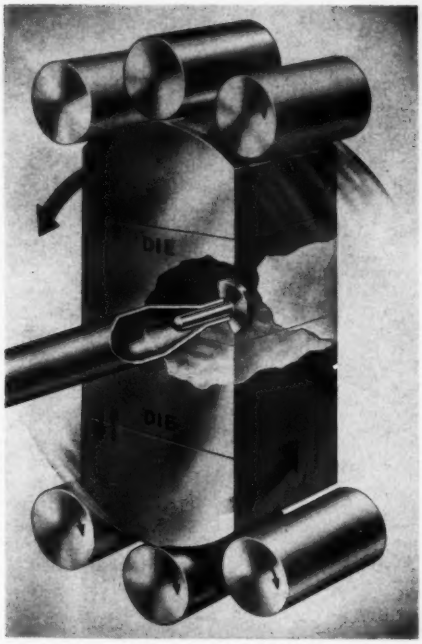






Swaging has many applications. Here are a few typical examples including assembly and contour work.

by Keith Bernhardt



An illustration of the swaging principle showing two dies in use. Spindle-holder for revolving dies and hammers are not shown.

Rotary swaging is an age-old operation, but a relatively untapped field with great potential for lowering manufacturing costs insofar as being used as fully as it could be. The series of swaging articles, beginning this month and continuing the next few months, is based on data gathered by Fenn Manufacturing Company, from its engineers and its customers.

In following issues of Tooling & Production, Mr. Bernhardt will discuss Metallurgy of Swaging, Types of Machines, and Tooling the Swager.

Usually swaging produces a net increase in length of material for a given reduction since, with the exception of an increased material density, the material displaced flows or escapes axially.

Tubing readily lends itself to swaging and often can be used as a substitute for a solid material, since swaging has a tendency to increase the wall thickness as well as build up its hardness. It is no problem to control the wall thickness of a tube swaged over an arbor. A single tube can, in fact, have a series of wall thicknesses, depending on the type of arbor and die arrangement used.

Usually, if the tube's initial diameter is more than 25 times the wall thickness it is necessary to use some sort of a supporting arbor during the entire reduction—step by step. If swaging is attempted with a greater than 25-times diameter to thickness ratio, the finish of the work usually wrinkles. Where this is encountered with a two-die swaging machine, a four-die machine might be used with success. Four-die swagers allow slightly higher reduction since there are more blows doing the work, each individual blow at a little lower tonnage than with the two-die arrangement. More will be said of swaging machines and dies in subsequent articles.

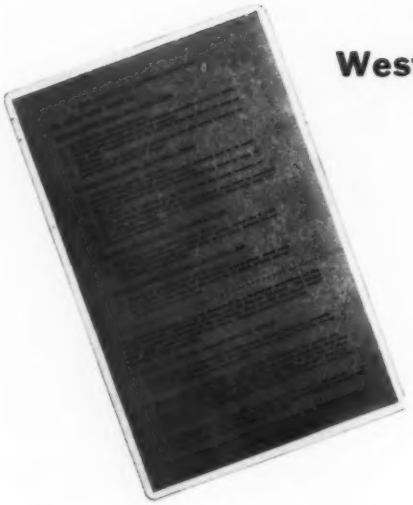
Practically all materials lend themselves to swaging with proper experimentation—including wood, paper, and plastics, along with the ferrous and non-ferrous materials. Wood and plastics, because of their "memory characteristics," do not lend themselves to permanent deformation, so swaging these materials is usually only to obtain temporary deformation — perhaps enough for insertion in some metal ring or clamp before they settle back to size. This is similar to shrinking a part into place.

A paper and resin combination can be worked out to the point where a bond is permanently established and the original paper shape unrecognizable.

Cast iron lends itself to swaging, too. However, in some cases, it is necessary to heat the metal prior to swaging to avoid crumbling, which is characteristic of cast iron.

Tolerance considerations are important in determining what can and can't be swaged. Usually swaging will offer tolerances in proportion to the diameter of the workpiece being swaged. In general, for pieces up to ¼" dia. a tolerance of 0.001" can be obtained. On larger work, tolerance expectations can be increased to 0.005". Like finish, tolerances are tied into the rate of reduction. end

Mr. Bernhardt, a Purdue graduate, has been with Fenn Manufacturing Co. for 12 years. He is currently a Sales Engineer there. Prior to that he was an experimental engineer at Pratt & Whitney Aircraft and a field engineer at Hartford Empire Co., a division of Emhart Manufacturing Co.



Laminated Card is "Bible" of Coding Program.

Westinghouse Calls For

Color Coding Dies for Safety

by William J. Kirsch

SOME 140 PRESSES AND 6000 DIES are involved in roughly 50,000 die setups a year at this division plant. As part of the total safety program for these operations, the company has developed an effective program for color coding dies which specifies the control to be used during operation of each punch press. Taken in their entirety, the overall safety program and the color coding program have been responsible for a five-year accident-free record in Beaver's punch press sections.

As the "bible" of the die guarding program, press guarding and control instructions as well as the color coding information are printed on a card that is laminated in plastic and distributed to all setup men, group leaders, quality control inspectors, and supervisors.

Mr. Kirsch is Safety Supervisor, Industrial Relations, at the Standard Control Division of the Westinghouse Electric Corporation in Beaver, Pa.

The four general control methods for punch press guarding, presented on the laminated card, are:

1. Two Hand, Single Stroke
   Color Code: Green

   a. No mechanical guards required.

   b. Two-hand electric or two-hand pneumatic controls are to be used.

   c. Controls must be locked and key removed.

   d. Foot pedal controls are to be removed from the floor or hung on the press.

   e. Parts are to be handled in and out of the die using tweezers or other approved mechanical device.

2. One Hand, Single Stroke
   Color Code: Yellow

   a. No mechanical guards required.

   b. One-hand electric or one-hand pneumatic controls are to be used.

   c. Controls must be locked and key removed.

   d. Foot pedal controls are to be removed from the floor or hung on the press.

   e. Parts are to be handled in and out of the die using tweezers or other approved mechanical device.

   f. This type of setup is not to be used unless free hand is occupied in some other capacity that will keep it out of danger area. For example, holding mandrel.

3. Foot Pedal, Single Stroke
   Color Code: Orange

   a. Mechanical guarding is used on this setup.

   b. All guards, consisting of front grill guard, sheet steel side guards, and press wing guards, must be in place before setup is released for production.

4. Foot Pedal or Hand-Continuous
   Color Code: Red

   a. Mechanical guarding used on this setup.

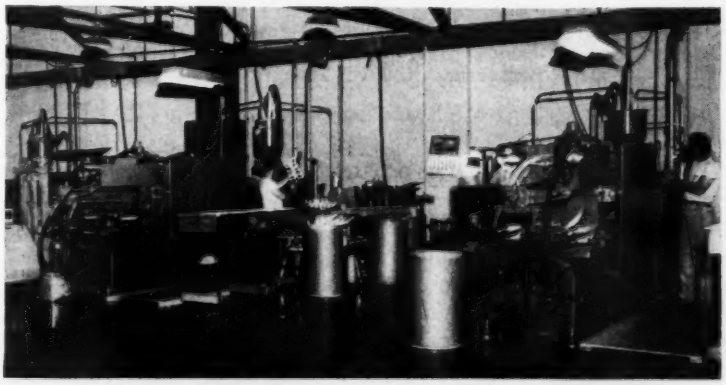
   b. All guards consisting of front grill guard, sheet steel side guards and press wing guards, must be in place before setup is released for production.

. . . **Continued on page 6**

500,000 PAIRS A MONTH FROM 3 NEW FELLOWS MACHINES!

Vulcan Corporation's plastics plant at Portsmouth, Ohio, is one of the most modern in the industry: opened in April, 1959, it's geared to turn out over half a million pairs of plastic heels a month. They use three fully-automatic Fellows 12-350 Injection Molding Machines, chosen only after careful study of the field by this 49-year old firm. The "12-350", making shots up to 20 ounces with the optional Pre-Pac device, actually cycles faster than many smaller machines! And it's fully automatic: one man can supervise three or even more machines! It's fast, easy to set up and one of the most versatile high-production injection machines on the market. Financing is no problem, either: with the Fellows Plans, your new machines can pay for themselves with the money they save. Ask your Fellows Representative for the full story: there are now four models of Fellows Injection Molding Machines. The Fellows Gear Shaper Company, Plastics Machine Division, Head Office and Export Department: Springfield, Vermont. Branch Offices: 1048 North Woodward Avenue, Royal Oak, Michigan; 150 West Pleasant Avenue, Maywood, New Jersey; 5835 West North Avenue, Chicago 39, Illinois; 6214 West Manchester Avenue, Los Angeles 45, California.

FELLOWS INJECTION MOLDING EQUIPMENT



CIRCLE INFORM-A-GRAM KEY NO. 59

Color coding dies for safety device identification is easy when you're armed with an aerosol paint can.

. . . Continued from page 58

Who Decides Method?

The method of operation to be used for a particular press is determined by a committee consisting of the safety supervisor, department foreman and the methods engineer. The method agreed upon is then entered on the operations card, and must not be changed unless reviewed and approved by this committee. After decision by the committee, the dies are painted immediately, while mounted in the press, by the use of pressure paint spray cans. Paint is applied to the front faces of the top and bottom die shoe.

Thereafter, the following responsibilities are defined:

The die setter is responsible for making press setups so that the controls and guards are in accordance with the color coding. No die is to be set up for production that is not coded.

The inspector is responsible for making certain that the controls and guards are as specified by the color coding of the die. He indicates that they conform with approved standards by noting that fact on a "First Piece Inspection Ticket" which must be attached to the press before it is cleared for production. The same requirements must be met during subsequent inspections.

The group leader is responsible for making certain that the control and guards conform with the color coding of the die and that proper operating instructions are given to the operator assigned to the job. If for any reason a special setup requires other than approved control arrangements, the department foreman must inspect the setup, give the operators any special instructions that may apply, and then note on the First Piece Inspection Ticket, "Special Control Approved." This note is dated and signed by the foreman.

Inspectors Key to System

At the Standard Control Division, the inspector is the key man in the program because he is the central check point. Not only does he check the product for first piece inspection, but he must also check the die for color code instructions and make sure all guards are in place and mounted properly. Before he signs the card to clear the press for production, press controls must be set up in accordance with the code of the die. Further, he will have the job shut down immediately if patrol inspection reveals that the job is being run differently than the color code designates.

The success of the color coding program at the division is based on these seven points:

- Set up the policy.
- Post or distribute the policy.
- Educate personnel and promote acceptance of policy.
- Set up inspection procedures.
- Make continuous checks.
- Make use of safety observers.
- Enforce the policy.

Have Top Management OK

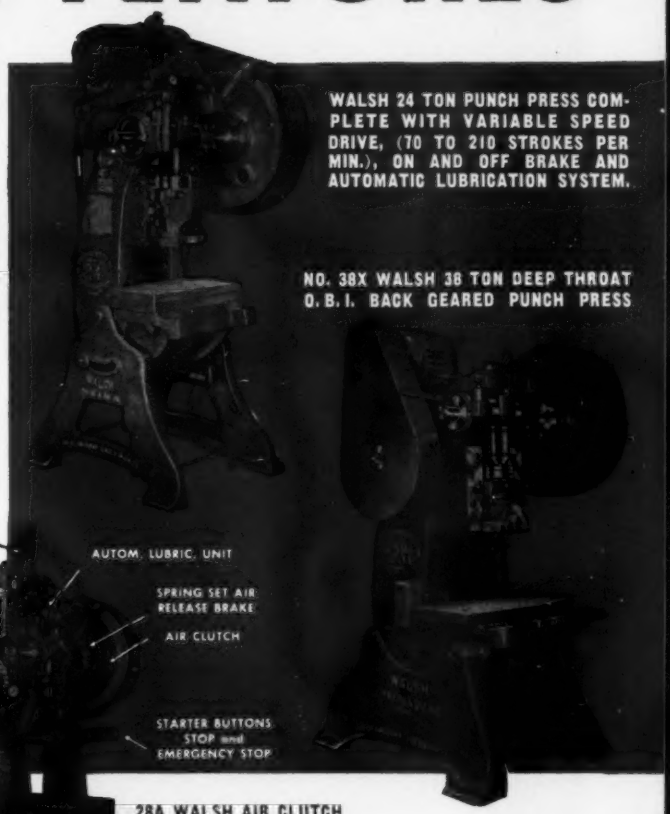
For such a program to be successful it is necessary to have top management approval of the policy and the policy must be well-known to all persons involved. It is important to make sure that personnel know all about the program — what they can and cannot do.

Since all people are different and react differently to restrictions imposed upon them, continuous checks are necessary. As a check upon even the best employee participation, it's best to set up a definite disciplinary policy in regard to violations of the program. In other words, to succeed we must make sure everyone is familiar with the purposes and requirements of the program and then enforce them.

After considerable experience with the die color-code system, the division is convinced that in rounding out the safety program, it not only pays off in accident-free experience, but in employee appreciation of management's regard for the well being of people.

30 DESIGN FEATURES

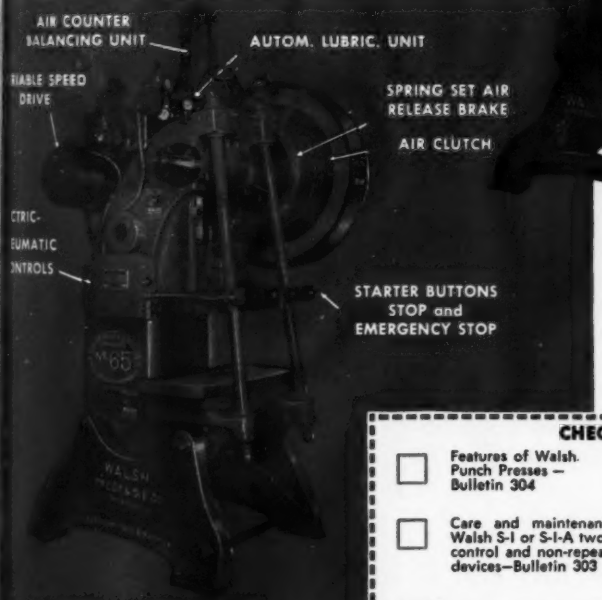
WALSH PRESSES have 30 construction features, not all of which are found on any one other press. Send for new literature describing these features which have made Walsh Presses RUGGED AS THE ROCKIES since 1907.



WALSH 24 TON PUNCH PRESS COMPLETE WITH VARIABLE SPEED DRIVE, (70 TO 210 STROKES PER MIN.), ON AND OFF BRAKE AND AUTOMATIC LUBRICATION SYSTEM.

NO. 38X WALSH 38 TON DEEP THROAT O. B. I. BACK GEARED PUNCH PRESS

28A WALSH AIR CLUTCH HI-PRODUCTION 28 TON FLYWHEEL ARCH PRESS


AIR COUNTER BALANCING UNIT
AUTOM. LUBRIC. UNIT
SPRING SET AIR RELEASE BRAKE
AIR CLUTCH
STARTER BUTTONS STOP and EMERGENCY STOP

NO. 65 WALSH AIR CLUTCH HI-PRODUCTION 65 TON O.B.I. FLYWHEEL PUNCH PRESS

SEND FOR SPECIFICATIONS ON HORN, HI SPEED AND SPECIAL PRESSES

Presses other than specified with longer or shorter strokes made to order. For other requirements such as air clutch, on and off brakes, variable motor drives, air cushions, and automatic lubrication refer inquiries to us.

AUTOMATIC KNOCKOUT IS INCLUDED WITH ALL PRESSES
ALL PRESSES "RUN-IN" WITH MOLYKOTE AT THE FACTORY

CHECK LITERATURE DESIRED—NO OBLIGATION

- ☐ Features of Walsh Punch Presses — Bulletin 304
- ☐ "Spec" chart for Walsh Presses — Bulletin ES102
- ☐ Walsh Presses — Bulletin 353
- ☐ Care and maintenance of Walsh S-I or S-I-A two hand control and non-repeat devices—Bulletin 303
- ☐ Installation — Instructions for Walsh two hand control and non-repeating devices —Bulletin ES108
- ☐ Application and use of Walsh open back inclinable punch presses—Bulletin 202

NAME_____

ADDRESS_____ CITY_____ STATE_____

50th ANNIVERSARY **WALSH PRESS AND DIE COMPANY**
Division of American Gage and Machine Company

4709 W. KINZIE ST., CHICAGO 44, ILL.
EStebrook 8-6700

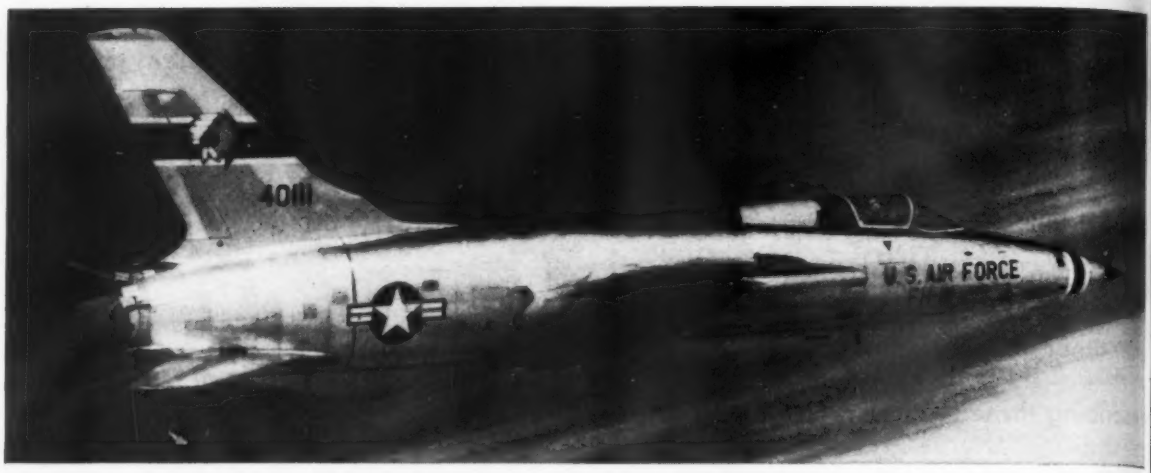
SIMPSON ELECTRIC CO.
5200 W. Kinzie
Chicago, Illinois
Ebsbrook 9-1121

CHAMPION PNEUMATIC MACHINERY CO.
Princeton, Illinois
3-1215

STANDARD TRANSFORMER CO.
Warren, Ohio
2-1563

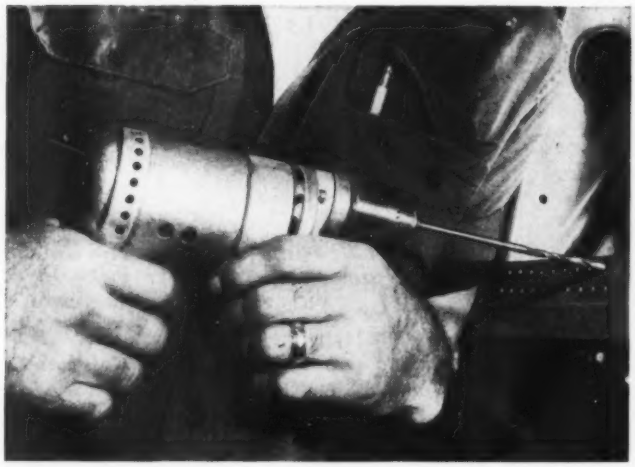
SIZE CONTROL CO.
2500 W. Washington Blvd.
Chicago, Illinois
MOnroe 6-6710

WE MANUFACTURE A COMPLETE LINE OF POWER PRESSES



PERFECTION!

The REPUBLIC F-105 THUNDERCHIEF..."World's most powerful one-man Airplane"

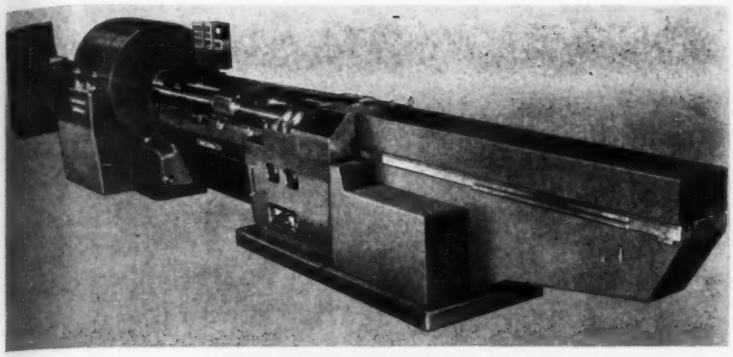


SUPREME BRAND CHUCKS!

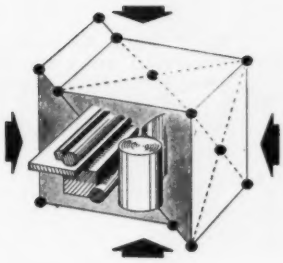
Used at REPUBLIC AVIATION and in hundreds of other plants where perfection is the goal. Ask your distributor.

SUPREME PRODUCTS CORPORATION • 2222 S. CALUMET AVE., CHICAGO • DIV. OF A•S•R PRODUCTS CORPORATION

CIRCLE INFORM-A-GRAM KEY NO. 62



A new member of the "chipless machining" family.

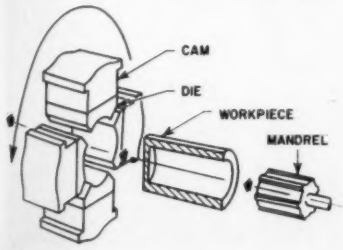


ID's by Squeeze

COLD FORMING OR CHIPLESS METALWORKING moves ahead. This time in the form of a new machine for producing special ID's in tubing. It's a pulsating squeeze method of moving metal—rather than removing it. The Intraform machine, developed by The Cincinnati Milling Machine Co., does its work quickly, automatically, and in one step.

Hollow cylindrical stock is placed over a mandrel and both are fed into an opening created by four dies. The dies pulsate, due to rotation and their camming action from contact with caged rollers. The cammed surfaces of the dies never lose contact with the rollers, thanks to centrifugal force. So, there is truly a squeeze rather than a hammering.

Fig. 2. Relationship of dies, workpiece, and mandrel in Intraforming.

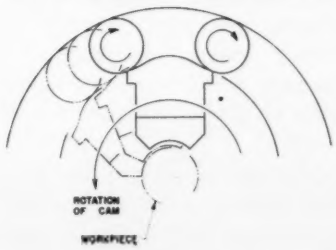


The mandrel is fed into the dies with the work on it, but the work is actually fed separately. This permits long pieces to be pushed through, and the mandrel retracted at an appropriate time to receive a new part. The new part, in turn, pushes the finished work out the back of the headstock. With this feed principle long pieces can be formed with a relatively short mandrel work-form.

Beside its ability to form intricate internal profiles, other operations can be Intraformed, such as pointing and tapering OD's, reducing diameters, and assembly work. It is also particularly well suited for laminating tubing where dissimilar metals are bonded together.

Workpieces may range in size from $\frac{1}{8}$" to 5" dia in either ferrous or non-ferrous metals, produced by a wide variety of methods, such as casting, forging, extrustion, and powder metallurgy.

Fig. 3. How dies rotate within the ring of rollers to obtain their action.



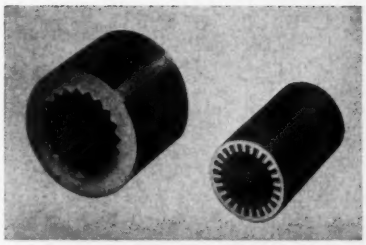


Fig. 1. Typical ID's after Intraforming.

This process forms parts to close tolerances; tolerances of 0.0002" total, are not unusual. Also, a 7 or 8 microfinish can be expected, depending on the nature of the surface to be Intraformed and the physical properties of the metal.

Then too, there is the added bonus of increasing the physicals of the metal by cold working. Both hardness and tensile strength can be improved by increasing density and by not interrupting the continuous fiber structure by cutting.

It's axiomatic that a material savings is assured since no chips are made. —W. E. H.

Fig. 1. Punch for stamping ambulance roofs has a zinc alloy core faced with a layer of epoxy resin.

Plastics Tooling Cuts Drawing Costs

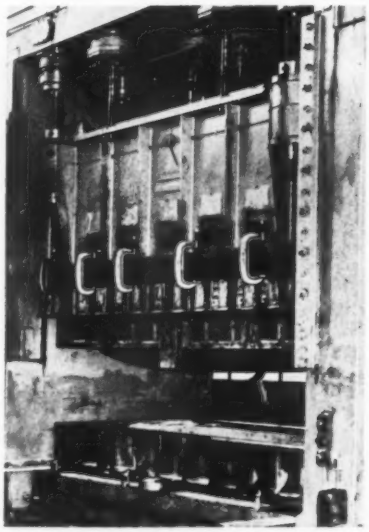


Fig. 2. Epoxy faced punch is held in a 1300-ton toggle press by five large clamps on each side.

PLASTICS ARE PLAYING a major role in bringing economies to metalworking, and drawing processes are among those which have benefited. An example is a draw die operation that uses an epoxy faced punch to stamp ambulance roofs at the Richard Brothers Division of Allied Products Corporation.

The punch consists of a zinc alloy core faced with 3/8" (± 1/8") of epoxy resin. This is cast in liquid form between the metallic core and a plaster mold positioned to provide the necessary clearance. The epoxy resin hardens, with negligible shrinkage, to the shape of the plaster mold, which is a duplication of a master model. Use of a parting agent on the plaster mold facilitates separation from the hardened plastic.

A 1300-ton toggle press lowers the punch to draw ambulance roofs out of 80" x 164" sheets of 18 or 20 ga steel stretched firmly across iron rings extending around a cavity. After a roof panel is drawn the rings are released, the panel is removed from the die, and the binder flash is trimmed off. This results in low-production runs of roofs 68" wide, 158" long, and 8" deep.

Compared to an all-zinc alloy punch, the plastic-faced die cuts the firm's costs for the operation by about 10%. The spotting time, alone, required to prepare the punch for stamping the roofs is halved. A zinc alloy punch as large as an ambulance roof requires spotting and fitting to desired accuracy, because unpredictable cooling variations in casting cause shrinkage and warpage which can be economically controlled to approximately 1/8".

Other advantages of the epoxy resin include easy replacement of all or portions of the facing as it becomes worn. The epoxy resin is light and easy to handle and no special equipment is necessary for mixing and pouring it. In addition, the plastic clings to the metallic core and does not react to moisture or moderate temperature changes by varying in size and shape.

Ren Plastics, Inc., maker of the epoxy resin compound used at Richard Bros., can supply additional information on plastics applications. Circle Inform-A-Gram No. A-2.

Fig. 3. Ambulance roof stamped with epoxy faced punch.

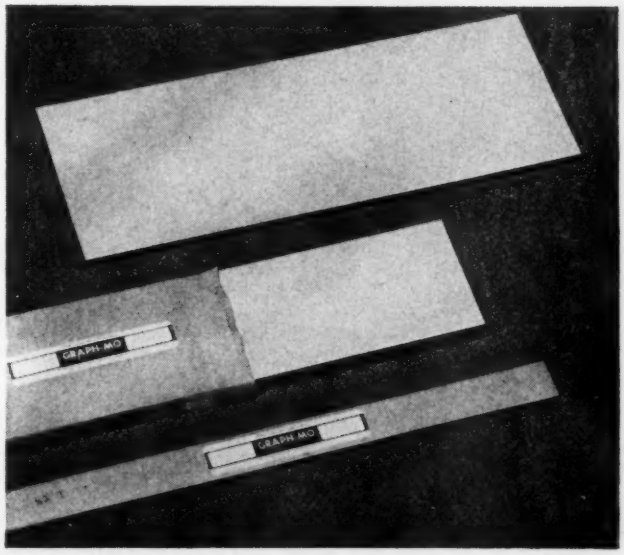
New economy for tool steel users . . .

FAMOUS GRAPH-MO® NOW AVAILABLE IN PRECISION GROUND FLATS

. . . from 41 distributors in 35 cities

Now you can get precision ground flats with all the advantages of the Timken Company's famous Graph-Mo® tool steel. They're available through the conveniently located distributors listed below. You get all these advantages: *Semifinished* . . . saving preliminary machining operations. *Graph-Mo outwears ordinary tool steels 3 to 1* because of the combination of free graphite particles and diamond hard carbides in its structure. *Machines 30% easier* than conventional tool steels. *Uniform response to heat treatment* eliminates distortion. *Specially wrapped* in protective envelopes carrying heat-treating information. *And there are 250 sizes* of flats to choose from.

Get your stock list from our distributors or by writing direct. There is only *one* Graph-Mo, and the Timken Company makes it. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*



DISTRIBUTORS OF TIMKEN GRAPHITIC TOOL STEELS

ALABAMA
Birmingham—O'Neal Steel, Inc.

CALIFORNIA
Bell (Los Angeles County)—A. Milne & Co., Inc.
Burlingame (San Francisco)—A. Milne & Co., Inc.
Los Angeles—Coulter Steel & Forge Co.
Los Angeles—Earle M. Jorgensen Co.
Oakland—Coulter Steel & Forge Co. (Emeryville)
Oakland—Earle M. Jorgensen Co.
San Francisco—Earle M. Jorgensen Co.

GEORGIA
Atlanta—A. Milne & Co., Inc.
Atlanta—O'Neal Steel, Inc.

ILLINOIS
Chicago—The Peninsular Steel Company
Melrose Park (Chicago)—A. Milne & Co., Inc.

INDIANA
Indianapolis—The Peninsular Steel Co.

MASSACHUSETTS
Boston—A. Milne & Co., Inc.

MICHIGAN
Detroit—Alloy Steels, Inc.
Detroit—A. Milne & Co., Inc.
Detroit—The Peninsular Steel Company
Grand Rapids—The Peninsular Steel Co.

MISSISSIPPI
Jackson—O'Neal Steel, Inc.

MISSOURI
St. Louis—Ford Steel Company

NEW JERSEY
Kenilworth—A. Milne & Co., Inc.

NEW YORK
Buffalo—The Peninsular Steel Company (Tonawanda)
New York City—A. Milne & Co., Inc.

OHIO
Akron—The Peninsular Steel Company
Cleveland—A. Milne & Co., Inc.
Cleveland (Bedford Heights)—The Peninsular Steel Co.
Dayton—A. Milne & Co., Inc.
Dayton—The Peninsular Steel Company
Dayton—Alloy Steels, Inc.
Toledo—The Peninsular Steel Company

OKLAHOMA
Tulsa—Earle M. Jorgensen Co.

OREGON
Portland—Pacific Machinery and Tool Steel Co.

PENNSYLVANIA
Philadelphia—A. Milne & Co., Inc.
Carnegie (Pittsburgh)—A. Milne & Co., Inc.

TENNESSEE
Chattanooga—O'Neal Steel, Inc.

TEXAS
Dallas—Earle M. Jorgensen Co.
Houston—Earle M. Jorgensen Co.

UTAH
Salt Lake City—Coulter Steel & Forge Co.

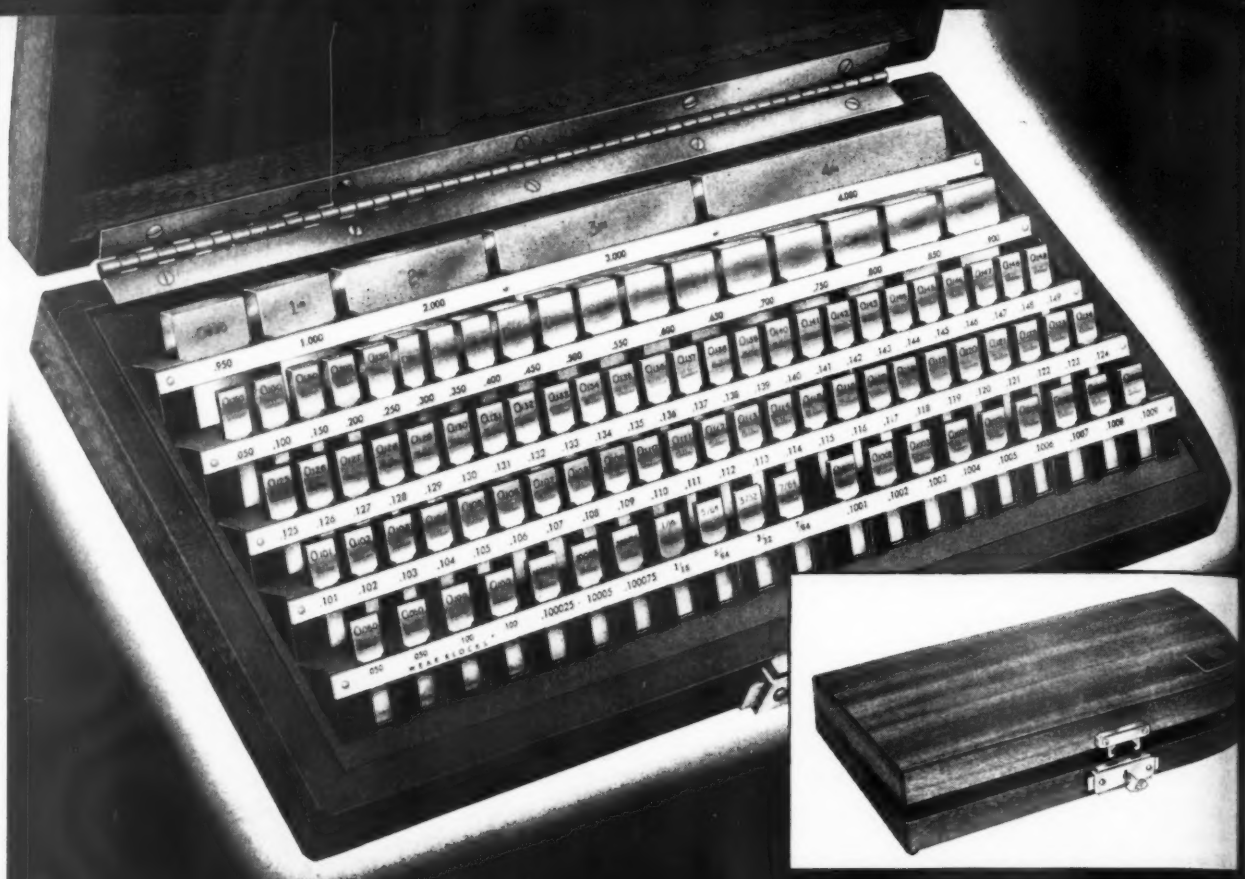
WASHINGTON
Seattle—Coulter Steel & Forge Co.

CANADA
London, Ont.—Vanadium-Alloys Steel Canada Ltd.
Montreal, Que.—Vanadium-Alloys Steel Canada Ltd.
Toronto, Ont.—Vanadium-Alloys Steel Canada Ltd.

TIMKEN *Fine Alloy* STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

CIRCLE INFORM-A-GRAM KEY NO. 65



THE CASE, also new and greatly improved, is made of finest quality, frosted walnut grain Melamine with Bakelite interior. (Patent pending.)

Webber ANNOUNCES

A New Superior Gage Block, "A+" +.000004 −.000002

Priced lower than former "A" and "B" sets.

These new blocks actually exceed U. S. Bureau of Standards or Federal specifications for Grade "A" blocks. Yet WEBBER has priced them even lower than now obsolete "B" blocks!

A COMPLETE 84 block set only $287.50

including two .100 Croblox (chrome carbide) wear blocks.

New, HIGHER Accuracy

New, BETTER Case

New, LOWER Prices

Don't wait! Write today direct to WEBBER for your free copy of folder describing this REVOLUTIONARY BUY.

Webber GAGE COMPANY 12903 Triskett Road Cleveland 11, Ohio

Largest exclusive manufacturers of precision gage blocks

READER SERVICE CARD — OCTOBER 1959 ISSUE

Do Not Use This Card After Dec. 31, 1959

INFORM-A-GRAM

TOOLING & PRODUCTION:
Please have information on items circled sent to me.

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

Is this issue of Tooling & Production Magazine addressed to you? Yes ☐ No ☐

(Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other).

ADVERTISEMENTS

2	19	34	71	93	116	844	1252	1284	1333	1382	1442
3	20	35	75	94	117	881	1253	1291	1341	1391	1471
4	21	36	77	95	118	882	1254	1292	1342	1392	1472
5	22	37	78	96	119	883	1261	1301	1351	1393	1473
6	23	38	79	97	120	1211	1262	1302	1352	1401	1501
7	24	39	80	98	142	1212	1263	1303	1353	1402	1502
9	25	40	81	99	145	1213	1264	1304	1361	1403	1503
10	26	42	82	100	146	1221	1265	1305	1362	1411	1521
11	27	59	83	101	149	1222	1271	1311	1363	1412	1522
12	28	61	85	102	151	1223	1272	1312	1364	1413	1523
13	29	62	86	103	155	1231	1273	1321	1365	1414	1531
14	30	65	87	105	156	1232	1274	1322	1366	1431	1532
15	31	66	89	107	841	1241	1281	1323	1371	1432	1541
17	32	67	91	111	842	1242	1282	1331	1372	1433	1542
18	33	69	92	115	843	1251	1283	1332	1381	1441	1543

EDITORIAL ITEMS

A1	C11	C26	C41	P10	P25	P40	P55	P70	P85
A2	C12	C27	C42	P11	P26	P41	P56	P71	P86
A3	C13	C28	C43	P12	P27	P42	P57	P72	P87
A4	C14	C29	C44	P13	P28	P43	P58	P73	
A5	C15	C30	C45	P14	P29	P44	P59	P74	
C1	C16	C31	C46	P15	P30	P45	P60	P75	
C2	C17	C32	P1	P16	P31	P46	P61	P76	
C3	C18	C33	P2	P17	P32	P47	P62	P77	
C4	C19	C34	P3	P18	P33	P48	P63	P78	
C5	C20	C35	P4	P19	P34	P49	P64	P79	
C6	C21	C36	P5	P20	P35	P50	P65	P80	
C7	C22	C37	P6	P21	P36	P51	P66	P81	
C8	C23	C38	P7	P22	P37	P52	P67	P82	
C9	C24	C39	P8	P23	P38	P53	P68	P83	
C10	C25	C40	P9	P24	P39	P54	P69	P84	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of TOOLING & PRODUCTION readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

Our reader service department is handling over 100,000 reader inquiries per year, and it is essential that the blanks at the top of each card be filled in accurately and completely. Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other.

READER SERVICE CARD — OCTOBER 1959 ISSUE

Do Not Use This Card After Dec. 31, 1959

INFORM-A-GRAM

TOOLING & PRODUCTION:
Please have information on items circled sent to me.

YOUR NAME _____ YOUR TITLE _____
(Please Print or Typewrite)

COMPANY NAME _____

COMPANY ADDRESS _____

CITY _____ ZONE _____ STATE _____

Is this issue of Tooling & Production Magazine addressed to you? Yes ☐ No ☐

(Please use only one of these INFORM-A-GRAM cards for yourself and let one of your associates use the other).

ADVERTISEMENTS

2	19	34	71	93	116	844	1252	1284	1333	1382	1442
3	20	35	75	94	117	881	1253	1291	1341	1391	1471
4	21	36	77	95	118	882	1254	1292	1342	1392	1472
5	22	37	78	96	119	883	1261	1301	1351	1393	1473
6	23	38	79	97	120	1211	1262	1302	1352	1401	1501
7	24	39	80	98	142	1212	1263	1303	1353	1402	1502
9	25	40	81	99	145	1213	1264	1304	1361	1403	1503
10	26	42	82	100	146	1221	1265	1305	1362	1411	1521
11	27	59	83	101	149	1222	1271	1311	1363	1412	1522
12	28	61	85	102	151	1223	1272	1312	1364	1413	1523
13	29	62	86	103	155	1231	1273	1321	1365	1414	1531
14	30	65	87	105	156	1232	1274	1322	1366	1431	1532
15	31	66	89	107	841	1241	1281	1323	1371	1432	1541
17	32	67	91	111	842	1242	1282	1331	1372	1433	1542
18	33	69	92	115	843	1251	1283	1332	1381	1441	1543

EDITORIAL ITEMS

A1	C11	C26	C41	P10	P25	P40	P55	P70	P85
A2	C12	C27	C42	P11	P26	P41	P56	P71	P86
A3	C13	C28	C43	P12	P27	P42	P57	P72	P87
A4	C14	C29	C44	P13	P28	P43	P58	P73	
A5	C15	C30	C45	P14	P29	P44	P59	P74	
C1	C16	C31	C46	P15	P30	P45	P60	P75	
C2	C17	C32	P1	P16	P31	P46	P61	P76	
C3	C18	C33	P2	P17	P32	P47	P62	P77	
C4	C19	C34	P3	P18	P33	P48	P63	P78	
C5	C20	C35	P4	P19	P34	P49	P64	P79	
C6	C21	C36	P5	P20	P35	P50	P65	P80	
C7	C22	C37	P6	P21	P36	P51	P66	P81	
C8	C23	C38	P7	P22	P37	P52	P67	P82	
C9	C24	C39	P8	P23	P38	P53	P68	P83	
C10	C25	C40	P9	P24	P39	P54	P69	P84	

Which article in this issue was of most interest to you? _____

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 7879, CLEVELAND, OHIO

TOOLING & PRODUCTION MAGAZINE

P. O. BOX 3505

CLEVELAND 18, OHIO

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 7879, CLEVELAND, OHIO

TOOLING & PRODUCTION MAGAZINE

P. O. BOX 3505

CLEVELAND 18, OHIO

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.
WESTERN UNION
TELEGRAM
W. P. MARSHALL, President
SF-1201
SYMBOLS
DL=Day Letter
NL=Night Letter
LT=International Letter Telegram
The filing time shown in the date line on domestic telegrams is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination
TO ALL DIEMAKERS:
TO ALL DIE USERS:
BANKO PATENTS COVERING MECHANICAL HOLDING
OR INTERLOCKING SEGMENTS IN CARBIDE DIES NOW PURCHASED
AND RELEASED TO THE PUBLIC.
CARMET DIVISION, ALLEGHENY LUDLUM STEEL CORPORATION

CARMET®

again serves the Die Industry

Making these Banko patents available, by dedication, for free and public use is another step in Carmet's policy of serving makers and users of carbide dies.

No one appreciates the problems of the die industry more than Carmet, the pioneer supplier and developer of carbide metal used in dies.

Carmet's precision preform methods result in cost-cutting advantages. Practically any shape or size of blank is accurately formed, requiring only a minimum amount of grinding to final dimensions.

All of Carmet's vast production and research facilities are at the service of all die makers. Let our die specialists help you on your problems.

Write to *Carmet Division, Allegheny Ludlum Steel Corporation, Ferndale, Detroit 20, Michigan.*

11-439

CARMET®

CEMENTED CARBIDE DIVISION OF
ALLEGHENY LUDLUM STEEL CORPORATION

AL®

CIRCLE INFORM-A-GRAM KEY NO. 67

Hydraulic Press-Welding Method for Production of Motor Lamination Stacks

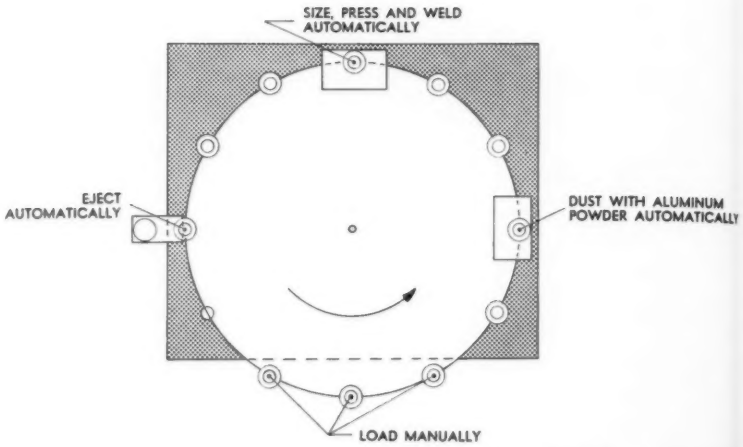


Fig. 1. Work table of automatic press-weld unit. Stacks to be welded are loaded on three fixtures which protrude from machine cabinet. Table indexes counterclockwise each time press ram is in "up" position.

by Warren C. L. Fricke

A WELDING UNIT built around a hydraulic press automatically sizes, presses, and welds stacks of motor laminations to form unwound stator cores for electric motors. Three of these machines have been designed and built by Cayuga for a manufacturer of small electrical appliance motors.

Each one is built around a Denison 6-ton modified strain-rod press, equipped with a 12-station index table which has an extended 32" dia dial. The stacks of 3¼" dia laminations are 1¼" to 2½" high, but this automatic process is applicable to stators for any size fractional horsepower motor simply by changing the fixtures.

Mr. Fricke is Design Engineer at Cayuga Machine and Fabricating Company, Depew, New York.

Welding Preferred

Although riveting is currently the more common way of assembling a stack of laminations, there are definite advantages to welding the laminations together. Costs are reduced by eliminating the need for and the handling of rivets in the punchings. In addition, welding produces a more rigid stack, since riveting sometimes allows the individual laminations to shift with respect to each other in subsequent operations after assembly.

In this welding process the stack is sized by a slightly oversize plug just before it is pressed and welded, to assure concentricity and a minimum of unwanted misalignment in the stack. This produces a more uniform and precise air gap between the assembled stator and rotor, which in turn results in more consistent performance from the finished motors.

Using a semi-skilled operator, each machine can produce up to 800 stators/hr, depending on the required thickness of the stack, yet allowing for an operator efficiency of 80%. This is faster than comparable riveting operations.

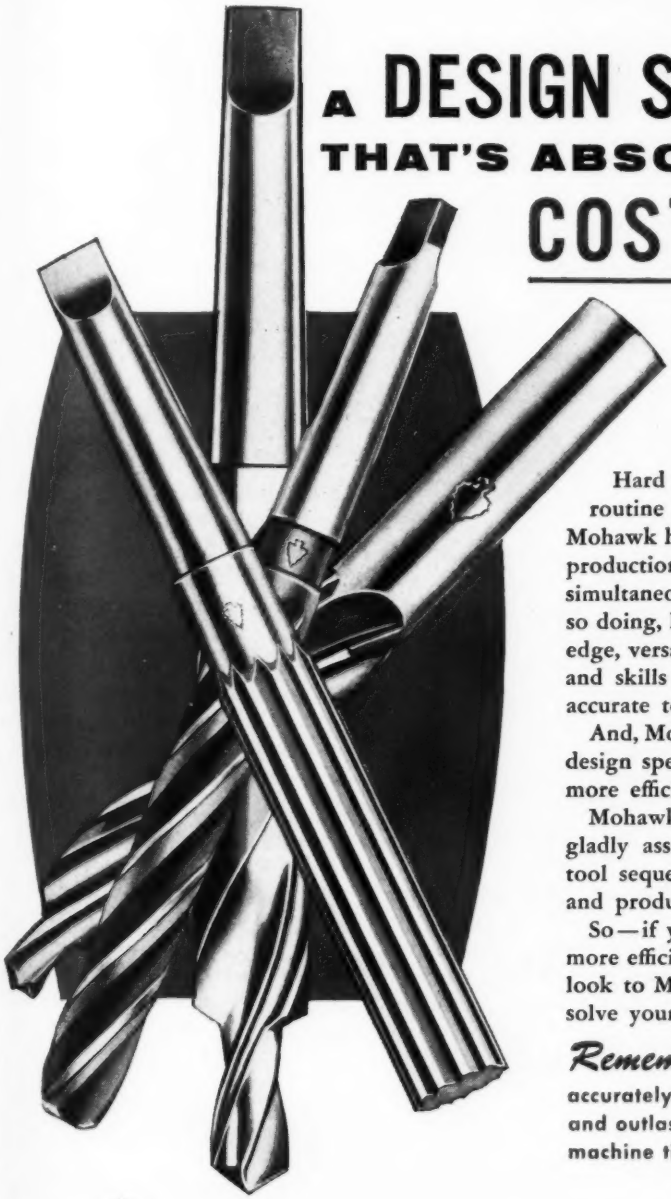
Press Modified

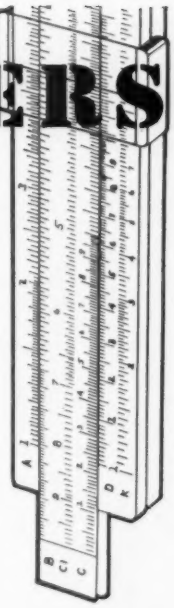
The dial of the welding machine is hydraulically sequenced to rotate, counterclockwise, one station each time the press rod is retracted. An interlocking circuit allows dial rotation only when the ram is in the "up" position.

The press has been equipped

ENGINEERS!

A DESIGN SERVICE THAT'S ABSOLUTELY COST-FREE





Hard to believe? Certainly . . . yet completely true, routine procedure at Mohawk. And here's why. Mohawk has long pioneered the functional, economical production and application of modern cutting tools for simultaneous drilling of multi-diameter cavities. And, by so doing, has developed the sound engineering knowledge, versatile talents, exclusive manufacturing methods and skills necessary to produce the world's finest, most accurate tools.

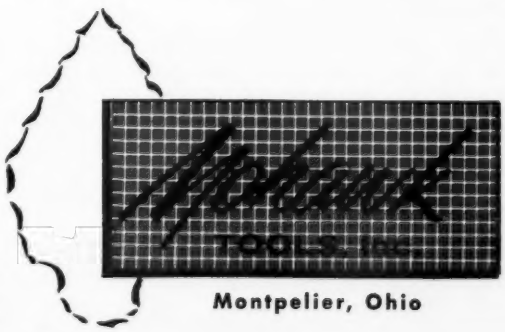
And, Mohawk will, *without obligation,* recommend and design specialized cutting tools in order that you may more efficiently accomplish those difficult jobs.

Mohawk does more than manufacture tools, they will gladly assist in determining the proper tools and/or tool sequence for specific operations . . . then develop and produce the proper tools for you.

So—if you'd like to remedy an existing problem, or more efficiently tool up for a new application, why not look to Mohawk—the *one* dependable source that can solve your problems and save you money.

Remember . . . Mohawk's properly designed, accurately produced, quality tools outwork, out-perform and outlast ordinary tools and save manhours, set-ups, machine time and eliminate costly separate operations.

"Design 13" *... a new pocket-size booklet was prepared especially to acquaint you with Mohawk's cost-free Design Service—plus illustrated examples to assist in more easily determining your needs. "Design 13" is yours for the asking!*



world's largest producer of Sublands

Montpelier, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 69

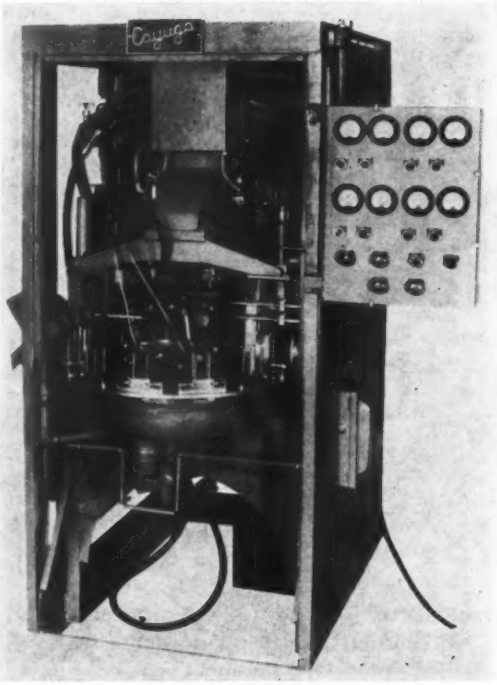


Fig. 2. Automatic press-weld unit with panels removed. Welding torches are carried on the press platen at rear of work table.

with a remotely operated valve which imparts a "dwell" to the ram when the ram is in the "down" position. It is during this "dwell" that the machine performs its principal functions of press, weld, eject, and load.

Twelve equally spaced fixtures for holding the stacks are on the 27" dia work circle. Each one consists essentially of a socket and four vertical pins upon which the laminations are stacked. The operator manually loads the measured-out, loose stacks onto the three loading fixtures. The pins, fitting into the winding slots, align the stacks radially and hold them in place for subsequent operations.

Press-Weld Operation

As the table indexes, the stacks are carried to the two work stations and to the unloading station (Fig. 1).

At the first work station the exterior surface of the stack is automatically dusted with aluminum powder to improve the quality and increase the speed of the weld.

After dusting, the assembly moves to the press station for sizing, pressing, and welding. A sizing plug on the ram head sizes the stack prior to pressing. The ram head is mounted on the end of the cylinder rod of the press and contains a water jacket, so a steady flow of coolant carries away the heat developed by the welding and prevents any adverse effect on the press cylinder or rod.

A heavy, rigidly fabricated platen, rolling on linear ball bearings for smooth operation, moves on the hardened and ground strain rods of the press. Denison supplied these strain rods "special" for Cayuga.

Four TIG welding torches, supported by the platen, make simultaneous welds across the outside of the stack on the "up" stroke of the platen. This welding function is performed while the part is being sized and pressed.

Parts are automatically ejected at the final station. A pair of air-operated claws pick up the welded stack, and an air-operated kick-off device sends it into an exit chute.

Unit is Enclosed

All of the machine's components are enclosed in a steel cabinet, with the three loading stations protruding. The force-ventilated cabinet has five readily demountable panels for optimum accessibility. Inspection windows in the upper side panels provide an unobstructed view of each arc.

The operator's panel is conveniently located on the cabinet at the left side of the machine. A pair of voltmeters and ammeters is provided for each welding torch with remote current adjusting pushbuttons below each group. Low- and high-pressure pumps are pushbutton controlled and an indicator light glows when the pumps are running. Start and stop buttons are conveniently located at the bottom of the panel. end

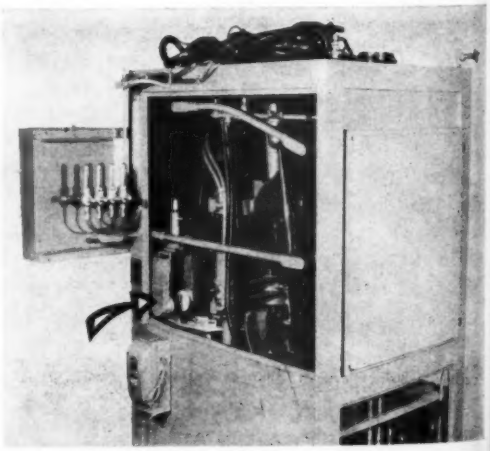
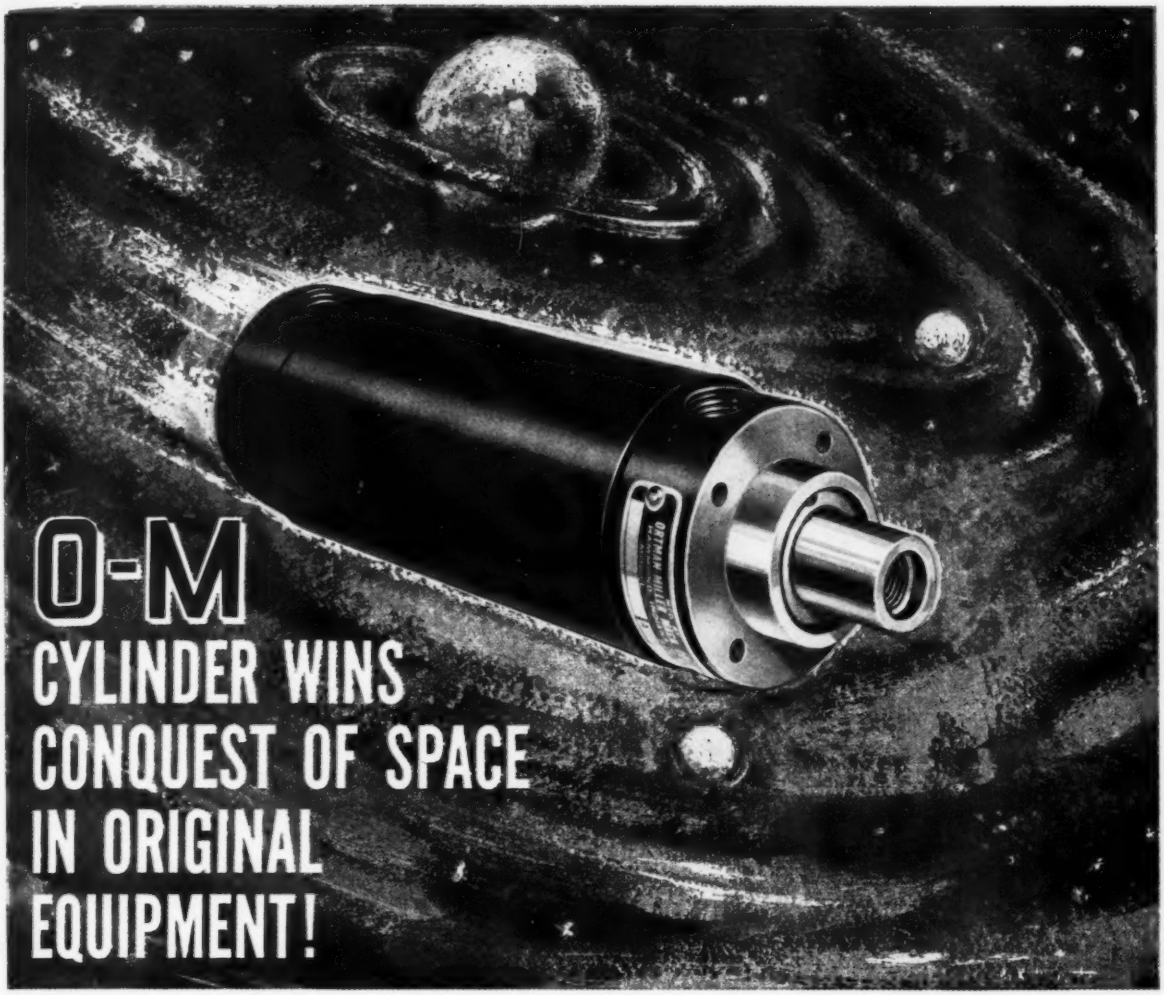


Fig. 3. Open-panel side view of Cayuga unit shows automatic device (arrow) which powders one stack of laminations while another stack is sized, pressed, and welded at press station to the right.



SERIES 101A

AIR 150 PSI • HYDRAULIC UP TO 1500 PSI • MEETS JIC STANDARDS

By fitting into one-third less space than a tie-rod cylinder of the same bore, this original O-M space-saving component gives greater flexibility to design, reduces weight and cuts installation time.

But there are many other reasons for using this O-M Round-line Cylinder that delivers smooth, dependable power. It has the lowest coefficient of friction . . . assures full-power starts . . . is sealed right—ports are easily oriented independently to 360 degrees...and, end plugs are tapped for universal mounting. Easily modified for special applications at a nominal extra over standard cylinder prices. Internal locking key makes it easy to disassemble, service and reassemble with no alignment problems.

Available for Air or Hydraulic circuits in a complete range of sizes (1½" to 8" bores) with standard, 2 to 1 or oversize rods. All-steel construction with bearing bronze. Completely interchangeable parts. Immediate delivery on many sizes.

Mail coupon at once for Bulletin 101A containing engineering drawings of cylinder, mounts, mounting brackets, capacity chart and other data.

ORTMAN-MILLER MACHINE CO.
21 143rd Street, Hammond, Ind.

☐ **Have representative call**
☐ **Send Bulletin 101A**

NAME_____ POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 71

Latest Guide to

Modifications for Forming PH Steels

by C. T. Olofson

PRECIPITATION-HARDENED stainless steels, PH15-7Mo and 17-7PH, are more difficult to form than 301 and 302 stainless steels. In tensile tests they show about 30% to 35% elongation in the annealed condition, whereas the 301 and 302 types show 50% to 55%. In addition to exhibiting poorer tensile elongation, the precipitation-hardening steels work harden more rapidly.

Forming procedures for the common stainless steels are adequately covered in manuals published by some of the producers. The procedures recommended for 301 stainless steel should be used as a guide when forming either 17-7PH or PH15-7Mo. Certain modifications, outlined below, however, are often necessary to compensate for the differences in properties in the PH alloys.

Bend Rolling Cylindrical Sections

1. Power ratings of bend rolls should be 50% to 60% greater than required for carbon steel.

2. The 17-7PH is harder and more abrasive to rolls than carbon steel, and is expected to wear rolls at about the same rate as quarter-hard 301 stainless steel. Case-hardened rolls should give satisfactory service.

3. Roll surfaces should be clean to prevent foreign material from being pressed into the formed surfaces of the steel, which lowers the corrosion resistance and causes rupture.

4. For producing cylinders of equal diameters, a sharper bend contour should be formed into 17-7PH than required for carbon steel. This compensates for the increased springback of 17-7PH and is accomplished by using tighter roll settings.

Deep Drawing

1. Because of their inferior ductility and greater rate of work hardening, 17-7PH and PH-15-7Mo stainless steels cannot withstand the severe single-step deep drawing operations that austenitic stainless steels can. If a deep drawn part is required, a series of mild draws and intermediate anneals (1900°F) should be employed.

2. After the drawing operation is completed, the trimmed part must be hardened to produce the required mechanical properties. If the part has received sufficient cold work to completely transform the whole part, aging at 950° to 1050°F is all that is required. If the part is not completely transformed by working, or transformed in some sections and untransformed in others because of local differences in plastic deformation, the part must be annealed at 1750°F, refrigerated at —100°F, and tempered at 950° to 1050°F.

3. Pay close attention to the cleanliness of the equipment.

4. Stainless steels are harder and more abrasive to dies and punches than carbon steels. Al-

Mr. Olofson is Principal Metallurgist, Ferrous Metallurgy Division, Battelle Memorial Institute. His work on forming precipitation-hardened alloys was done for the Defense Metals Information Center at the Institute.

loy tool steels are therefore used as dies or die inserts. Steels which have been used include the 3C-1Cr-1Mo-12V composition, heat treated to 64-66 Rc, and the high carbon-high chromium die steel, heat treated to 60-62 Rc. Cemented carbide dies have been used for long runs; cast iron, for short runs.

5. Blank sizes are determined in the same way as blanks made from carbon steel. They should be cleanly cut and the edges deburred, because edge cracks are likely to extend during forming and burrs will be compressed into the surface.

6. Blanks should be annealed for maximum ductility and minimum yield strength. This is done by heating to 1900°F and then air cooling to room temperature. Annealing in air is recommended. Annealing in cracked ammonia or in an endothermic atmosphere is not recommended because nitrogen or carbon pickup may occur and cause poor heat treating response.

7. Blanks should be handled with reasonable care. Scratches and pits are stress raisers and can cause premature failing of the finished part.

8. Best drawability is obtained at low forming rates. Speeds from 10 to 20 fpm seem appropriate for either PH15-7Mo or 17-7PH.

9. Lubricants are necessary to minimize galling. A heavy bodied fatty or mineral oil of the chlorinated or sulfurized types should be used for heavy pressure work. Lighter oils and soap solutions are adequate for light pressure forming. Lubricants can be applied to the blanks by swabbing, dipping, or spraying.

10. The lubricants must be removed from the formed parts prior to any annealing operation to prevent contamination of the steel by either carbon or nitrogen. This can be done effectively in a vapor degreasing tank.

Manual Spinning

1. The high rate of work hardening and the inferior ductility of the precipitation-hardened alloys makes manual spinning of severe contours difficult. Nevertheless, these steels are being spun.

2. The chief requirements for the spinning lathe include capacity to maintain required speeds when tool pressures are heavy, freedom from vibration throughout forming, a true running spindle, and adequate clamping pressures.

3. Considerably more power is required for 17-7PH and PH15-7Mo than for mild steel, not only to start plastic deformation but also to overcome rapidly rising yield strengths caused by work hardening.

4. Formers or mandrels should be made of steel or steel-reinforced wood to withstand the heavy forming pressure required, and to maintain dimensional accuracy.

5. Round-nose or roller type spinning tools can be used. Round-nose tools must have smooth bearing surfaces to prevent surface damage to the work. A hardened and polished or chromium-plated surface is desirable. Roller type tools reduce frictional drag. They can be made of hardened and polished steel; AISI-D2 and AISI-07 steels have been used, the former being recommended for long runs. Bronze can also be used and is advantageous for light work because of its lower frictional coefficient against stainless steel.

6. Blanks for manual spinning should be flat; of true circular shape; free of edge defects such as burrs, nicks, and scratches, to prevent the start and propagation of cracks from the edges of a highly strained material; of uniform thickness; thoroughly clean; and free of surface defects such as gouges and scratches.

7. Rising yield strengths due to rapid work hardening mean springback problems. The precipitation-hardened alloys are expected to be more difficult to lay against the spinning block than austenitic stainless. Hence, greater allowances must be made for elastic recovery when tool pressures are removed.

8. Because of the many variables present, it is not feasible to evaluate spinning speeds for use on stainless steels. It appears, however, that the chromium-nickel grades (except 305) may require from one-third to one-half the speeds needed for carbon steel.

9. Adequate lubrication is necessary between tools and work surfaces. Lubrication reduces frictional heat and protects the metal surface from damaging tool drag and its resulting seizing and galling.

10. Satisfactory lubricants include thickly applied laundry soap, lard oil, paraffin, and soap-grease mixtures. Heavier bodied oils are desirable for extremely severe work. It is necessary to remove the lubricant completely prior to any annealing operations.

The 17-7PH and PH15-7Mo precipitation-hardened stainless alloys are normally pickled after every annealing operation. This can be accomplished by immersion in conventional acid pickling baths (10% nitric acid, 3% hydrofluoric acid solution, or various sulfuric acid solutions). Best results, however, are usually obtained by using a salt bath treatment to loosen the scale, followed by a short acid pickle to produce a bright surface. A citric-phosphoric acid solution is reported to work very well as a brightener. end

When Do You ☐ Make ☐ Buy Your Tooling?

by Gerald Grant

THERE ARE LITERALLY THOUSANDS of tool and die shops offering their services, ranging in size from one-man operations to million dollar corporations of national and even international prominence.

Considering this large number of suppliers of tooling the questions arise: Why are there so many? Why don't all manufacturers of metal products make their own dies? Which is more economical for the manufacturer — to build dies or to "farm them out"?

There is one basic economic reason for the large number of independent tool and die makers. Many seasoned die makers, with 10 to 15 years of experience, start their own businesses so their earning capacity is limited only by their ability to compete for manufacturers' orders. This competition is keen and many metal parts producers are taking full advantage of this condition.

When does it pay a manufacturer to buy dies or other special tools from such sources, and when is it better to build his own? Generally, small fabricated product makers find that all of the individual metal components they need cannot be purchased from stock. So, they look for sources to make these to their design, by stamping, casting, or other method, all of which require special tooling. Since a small company making these "specials" is not ordinarily equipped to build tools, they must be obtained either directly or indirectly from a tool and die shop. In this case, it is hardly ever economical for a small parts manufacturer to equip himself with machinery and hire personnel which would enable him to build his own tools.

Medium Plant's Needs

As the manufacturer grows to a medium-sized company, his tooling situation tends to change. He needs tools more frequently, many times at short notice. He also finds that it now pays to stamp out components, and to perform other fabricating operations which as a smaller company he would hesitate to do. In other words, while he previously concentrated his efforts on assembly, warehousing, and distribution, he now goes one step further and begins to fabricate most of the components prior to assembly.

This step usually proves economical not only where the increased volume indicates such methods, but also where the plant is located in an industrially undeveloped area — where sources are distant, and much time and expense is liable to be incurred by transportation, correspondence, and long distance phone calls in dealing with suppliers.

Plan Tool Maintenance

At this point it is advisable to consider the establishment of a tooling department within the company. Machinery and tools used in the plant require general and preventive maintenance, even if they had been purchased

Mr. Grant is Tool Engineer at Capitol Products Corp., Mechanicsburg, Pa.

New! AIR CONTROL UNITS

Automatically

- ★ Filter pressurized air to provide a clean, dry air supply
- ★ Compensate for fluctuations in air pressure delivered by the air supply system
- ★ Compensate for variations in cfm requirements of pneumatic equipment
- ★ Adjust amount of misted lubricant to meet changing cycle rates or surge demands

The new Bellows Lubri-Air® Control Unit

T.M. Registered Pat. Pending

● This new Lubri-Air Control Unit, made by The Bellows Co., and sold and serviced by Bellows and Valvair Corporation Field Engineers, is a major break through to the problem of supplying clean, dry, pressure-regulated and properly lubricated air to pneumatic equipment.

The Bellows Lubri-Air Control Unit, once set to match the needs of the equipment it serves, automatically removes dirt and moisture from the air stream, maintains a constant down stream pressure regardless of fluctuations in supply pressure or in cfm requirements, and feeds a correct amount of misted oil to the air stream regardless of variations in the air flow rate.

Bellows Lubri-Air Control Units assure continuous top working efficiency as well as maximum long life with minimum maintenance from air-powered equipment.

Available for immediate delivery in the ¼", ⅜" and ½" sizes. ¾" and 1" sizes shortly.

See your Bellows-Valvair Field Engineer or write direct to Dept. TP1059, The Bellows Co., Akron 9, Ohio, for descriptive Bulletin LA-15.

14978

The Bellows Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 9, OHIO

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co., Valvair, Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 75

Tooling Sources . . . In the Shop or Out?

	Tool Maintenance	Gen'l Prod. Tools	Rush Jobs	Experimental Tooling
Small Manufacturers	out	out	out	out
Medium Manufacturers	in	in/out	in	in
Large Manufacturers	in	out	out	in/out

from outside sources. So, some form of machine shop becomes a necessity.

During times when little maintenance work has to be done it will pay to keep these skilled people busy, and very often it's economical to let them work on new tooling projects. These should be of such a nature that interruptions for tool maintenance work, which delay the progress of the tool making projects, won't matter. Experimental work on future products, general improvement of existing manufacturing methods, and other tooling tasks with flexible target dates are ideal "filler" jobs for a tool maintenance department.

Troublesome Rush Job

Many times, too, a job-lot shop is contacted on short notice by a highly valued customer, who demands an immediate design change. New parts are needed to change the product to his liking. New dies must be built at once to fill the order quickly before the customer decides to find a source which can give him faster service. What is the best course of action regarding procurement of new tools and dies?

It is difficult to find an independent die shop willing to drop all other work in progress in order to start on your job. With luck one may hit upon one which happens to have a slack period at the time. A rush order is placed. Lots of overtime and premium prices follow. Mistakes are made in the excitement of the rush. Frequent trips and phone calls are made to check on progress. Finally the tools are delivered and invariably they require time-consuming adjustments before they can be used efficiently.

This is typical of a "rush job." It is not profitable but the loss may be justified if the customer appreciates such effort. It also is an example of where building the tools in your own plant could prove more economical.

Assuming the machinery and equipment are available, all available qualified personnel could be summoned to operate, with overtime and a second shift if necessary. Though premium wages are undoubtedly adding to the cost of the tools, they are offset to a considerable extent by the fact that fixed overhead expenses remain the same regardless of number of hours worked. This fact is very often overlooked when premium rates are charged by independent sources.

Experimenting Is Costly

Another good reason for considering construction of tooling in the job-shop would be the experimental nature of a job. If an independent shop will accept an order of such nature with a fixed, predetermined price, this amount will be large enough to cover all contingencies. If a "cost plus" agreement is made, it must be assumed that the source's skill and facilities are superior to the job-shop's and of unquestionable integrity; in any other case such an agreement could be wasteful.

When we consider larger plants, producing more complex assemblies, such as electric appliances, automotive equipment, machinery, and aircraft, the situation changes again. Special tools are numerous, delivery schedules and target dates are of utmost importance. Tool maintenance people are usually completely absorbed with the constant flow of maintenance and repair work, which increases as machinery and tools become more complex. Tooling for new products has to be completed within a limited time and requires so many man- and machine-hours that no single source can possibly provide all tools and dies within the period allowed. Most of the nation's die shops owe their very existence to this condition. Although some large corporations have their own die shops or have obtained financial or even managerial control over "independent" tool and die shops, in the long run the independently competing sources will build tools more economically. end

Punch Design Ups Output and Quality

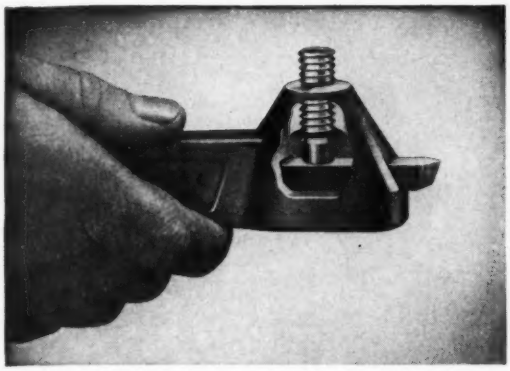
A special punch and die set is used by Losch Boiler Co. to punch 3½" x 4" holes through ⅛" boiler plate, permitting faster, more accurate assembly of water-circulating pipes in movable water-cooled grates.

Cleveland Punch & Shear manufactured the heavy duty punch which features a floating spring-center locating pin that recedes into the punch once it is accurately centered on the workpiece. Oblong in shape, the special punch has a ⅜" shear, 5" head, 4-11/16" shank, and is 3⅛" long. Its die has an outer dia of 6" and is 1⅞" high.

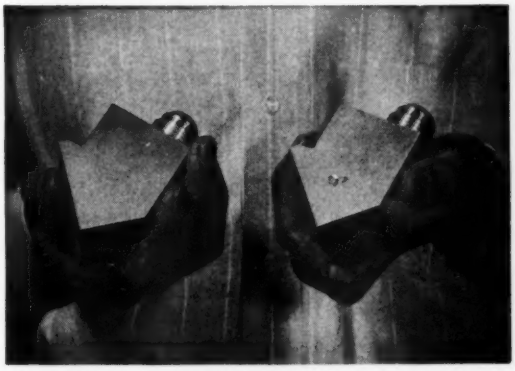
Practical Tooling Tips

NUMBER 1 OF A SERIES

Everyday more and more shops are using standard Vlier Tooling Accessories in place of custom-made devices for both tooling and original equipment applications. The precision construction, product uniformity and quick availability of these simple time-savers have made them tool room favorites. Why don't you start saving from their use?

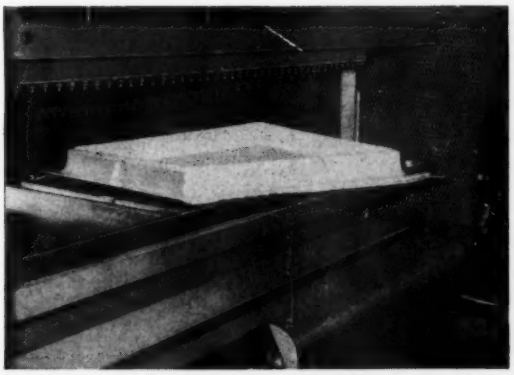


TO GET GREATER TOOL BIT RIGIDITY replace the tool holder screw with a Vlier Swivel-Pad® Clamp. The large, flat pad face provides many times more clamping area. Bits can be held tighter, reducing chatter and vibration. Small, narrow cut-off blades, multipoint tools, even stub ends can be rigidly held. Unique ball joint construction gives smooth angle adjustment in all directions.



EASY WAY TO STOP MARRING surface of part held in fixture. The part on the left was securely held in the fixture with a Vlier Swivel-Pad® Clamp. The scrapped part on the right was held with an ordinary set screw. With the Vlier Swivel-Pad® Clamp the pad stops at first contact with the part; screw torque is absorbed by a ball, preventing damage to the part. This exclusive ball joint construction also provides adjustment to off-angle surfaces.

SPRING PLUNGERS LET WRENCH DO MULTIPLE DUTY—The compression tool shown above is used to attach connectors to electrical wires. Formerly, each size wire connector required a different size tool. But now, through the use of Vlier Spring Plungers, one tool attaches all sizes of connectors—through the use of changeable jaws. The appropriate jaw for any size connector is easily inserted, accurately positioned, and held in place with a Vlier Spring Plunger.



THE RIGHT AMOUNT OF END PRESSURE AND NO MORE is what this spring plunger application calls for. More than 150 Vlier Spring Plungers are used to hold a plastic sheet in position during the forming operation of a plastic refrigerator door liner. Spring Plungers provide just the right amount of pressure to produce a perfect liner.

New catalog now ready! Send for your copy today.

Insist on Vlier Tooling Specialties... there's still no substitute for quality.

VLIER ENGINEERING CORPORATION

A subsidiary of Barry Controls, Inc.

8900 Santa Monica Blvd. • Los Angeles 46, California

CIRCLE INFORM-A-GRAM KEY NO. 77

TON FOR TON . . . DOLLAR FOR DOLLAR

FEATURING NIAGARA'S FAMED MULTI-POINT MECHANICAL SLEEVE CLUTCH

Picks up load on 14 engaging jaws. Applies driving force concentrically without keys or pins. Assures instant engagement and maximum productive strokes per minute. Needs no air nor electricity. Practically no maintenance. Greater safety: Simplified controls, fewer parts to wear out. *Yes, it permits, inching, too.*

1¼ - 6½ inch shaft diameters

5½ - 150 ton capacities

Here's a workhorse that's known for setting the pace on the most demanding jobs... jobs where the clutch is engaged and disengaged at every press stroke... jobs that call for operation three shifts a day, day in and day out.

Built and *backed* by a company which produces industry's greatest variety of inclinables*, Series A Presses have amassed an unusual success record in thousands of applications. To be specific, let's take a close look at a Series A user:

28 OBI'S SINGLE STROKED 707,140,000 TIMES WITHOUT ONE CENT SPENT ON CLUTCH ENGAGING SURFACES

Automatically fed for single stroking operations, 28 Series A Presses have produced 707,140,000 parts in the plant of a renowned appliance manufacturer since 1950. Clutches have required but $123.30 in replacement parts. No engaging surfaces have been replaced on any press. Examination shows no measurable wear. Original machining marks still visible.

GET THE FULL REPORT

Write for the complete, documented job study, "707,140,000 Clutch Engagements," as well as Bulletin 58 containing data and specs on Niagara's remarkable line of Series A Inclinables.

Note: Niagara also builds single and double crank OBI's with Electro-Pneumatic Friction Clutches and Electro-Pneumatic Sleeve Clutches to meet every need. *You name it!

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N.Y.

District Offices:

Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia

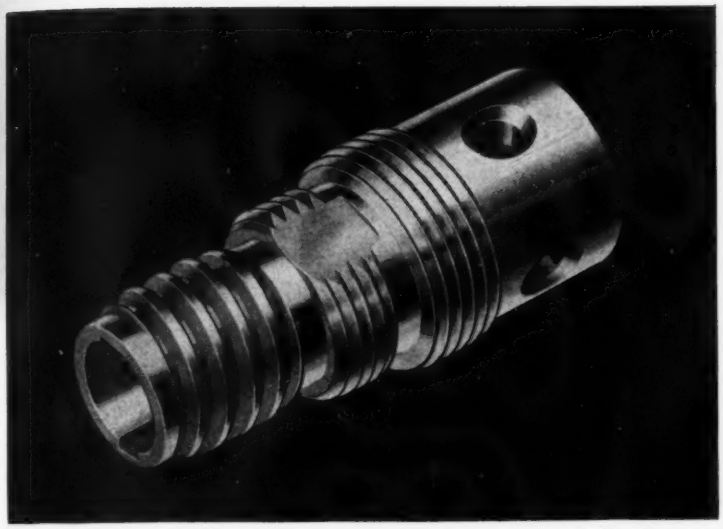
Distributors in principal U.S. cities and major foreign countries

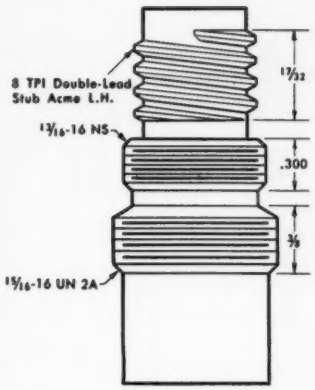
NIAGARA (SERIES A) OBI PRESSES

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work

CIRCLE INFORM-A-GRAM KEY NO. 78

COST CUTTING on tough jobs—like rolling a double-lead Stub Acme thread—may be easier than you think. Olson Mfg. Co. needed only a minor adjustment in a standard Anaconda rod

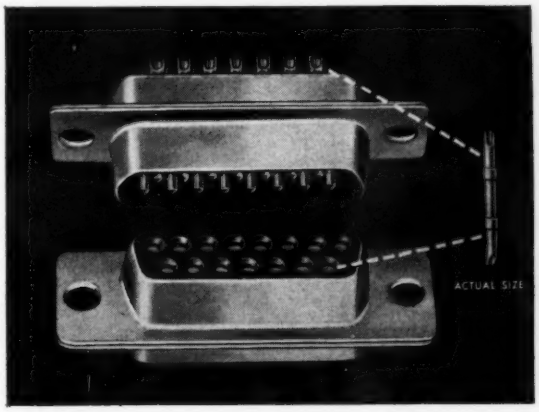


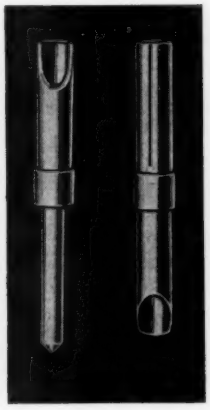


Rolling three threads *(drawing, right)* in two positions on a 6-spindle automatic meant cost savings for Olson Mfg. Co., Worcester, Mass. The Acme thread, however, posed problems. American Brass specialists suggested minor modification of standard Anaconda Free-Cutting Brass Rod to provide the extra ductility needed. The idea worked and the resulting valve spindle is shown above, about 1½ times actual size.

—or maybe you need a different alloy rod. The tiny connectors, right, have to be machined from .078" rod, requiring many precision form-cutting, drilling, slotting operations. So machinability is a vital property of the rod used—but so are adequate electrical conductivity, high strength, and fatigue resistance.

Cannon Electric, Los Angeles, makers of these electrical plug assemblies, had to find a rod with a delicately balanced combination of mechanical properties to provide the unfailing and continuous performance required. They found it in Anaconda Free-Cutting Phosphor Bronze-610 Rod, developed by American Brass metallurgists to combine the strength, resilience, fatigue resistance of phosphor bronze, and machinability approaching that of free-cutting brass.





MEETING the joint requirements of designers, manufacturing men, and buyers—to achieve high quality and performance while simplifying fabrication and cutting over-all costs—is an important function of American Brass technical specialists. For imaginative and practical help of this kind, see your American Brass Company representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6009

ANACONDA®

COPPER · BRASS · BRONZE
NICKEL SILVER · MILL PRODUCTS

Made by The American Brass Company

CIRCLE INFORM-A-GRAM KEY NO. 79

M1238-1818 — *Range 18" x 18", working distance 9" to infinity. Reads to 0.001" up to 24" working distance. Protractor ocular reads to 3 minutes of arc. Image is erect.*

Cut inspection time in half

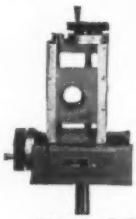
with new Gaertner Coordinate Cathetometers

These convenient, reliable optical instruments permit making precise coordinate measurements in a vertical plane. The two dimensions are measured with one setting, object does not have to be rotated. Inspection time is cut in half and resetting errors eliminated.

Versatile Gaertner Coordinate Cathetometers are ideally suited for precision measurements on large objects; also objects or points in recessed, remote, or inaccessible locations. Applications include measuring jet engine sections, complicated castings, printed circuits, bolt holes and bosses on large piece parts, traces on cathode ray tubes, etc.

Because these are optical rather than mechanical measuring instruments, you make non-destructive measurements without contact, distortion, or concern about pressure being applied to the object when making a setting. Instruments available in English or Metric system.

M1236-46— Horizontal range 6", vertical range 4". Reads to 0.0001", working distance 5" to infinity.



M1236-22— Range 2" x 2", reads to 0.0001". Working distance 5" to infinity. Shown with 19 mm mounting rod, and without telemicroscope. Instrument permits precise coordinate movement of other objects such as photo cells, probes, etc., in place of telemicroscope.

Write for Bulletin 188-53 & 194-57

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 80

MANUFACTURING MEMOS

Cheaper Titanium . . . An electrolytic process promises to bring down the cost of producing titanium—a so-called "rare" metal, but the fourth most plentiful structural metal in the world. Separation of titanium from its ore has been a big difficulty but this new process, developed by Dr. Guy Ervin, Jr., Dr. Herbert F. G. Ueltz, and Malcolm E. Washburn, Norton Co. research men, after seven years of work, makes it easier.

Ideas Pay Off . . . Maybe you've never made a contribution to the company suggestion box, but a survey by the National Association of Suggestion Systems shows that many do. In 1958 their 238 member-companies received over a million and a half employee ideas, of which about a third were used. Total rewards for the ideas amounted to over $13-million.

Zirconium Blocks . . . Fonda Gage Co. recently used zirconium, an unusual gage material, in the manufacture of several sets of square gage blocks in 20 different sizes. Made for The Olin Mathieson Chemical Corp., they're being used as masters for ultrasonic gaging devices. The reason: to provide the utmost accuracy by using masters of the same material as the part being measured.

Complex Controls . . . Looking into the future, the National Electrical Manufacturers Association forsaw the increasing complexity of industrial control systems. So, they've organized an Industrial Automatic Systems Section. The section isn't developing standards, but rather recommending requirements for components in numerical control systems.

Business Is Up . . . "The dollar volume of orders in the material handling equipment industry for the first six months of 1959 are 33% above the bookings reported in the corresponding months of 1959," reports Eugene Caldwell, president of The Material Handling Institute, Inc.

Drawings Hints . . . Give your technical papers and articles more punch with clear and legible illustrations. You'll find that "American Standard Illustrations for Publications and Projection," Y15.1-1959, shows how to prepare graphs and line drawings, and letter as well. Get one for $2 from American Standards Assoc., 70 E. 45th St., New York 17.

TEST after TEST

proves the economy of using CLE-FORGE SPECIAL PURPOSE DRILLS

Time after time CLE-FORGE Special Purpose Drills have clearly demonstrated their ability to produce *more holes* at *lower cost,* as proved by hundreds of actual tests in customers' plants. Typical records show that CLE-FORGE Special Purpose Drills . . .

. . . produce 10 times more holes per grind . . . increase production 80% . . . double the number of holes per grind . . . cut cost per hole . . . eliminate breakage . . . speed production at no increase in tool cost . . . average 13,000 more holes per grind.

These are not "special" tools, but are stock drills at regular prices . . . available for immediate delivery.

For greatest economy, CLE-FORGE Special Purpose Drills can be ordered with tangs (at no extra cost) and used with CLEVELAND Split Sleeves. Instead of paying for a taper shank on every drill, you get the needed length with a CLEVELAND Split Sleeve—which outlasts many drills.

If you have a problem of high drilling costs, perhaps a CLEVELAND Service Representative can help you solve it with CLE-FORGE Special Purpose Drills. Contact our nearest Stockroom, or . . .

TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

for CLEVELAND ◈ Quality Tools . . . *prompt delivery from stock*

THE CLEVELAND TWIST DRILL CO.

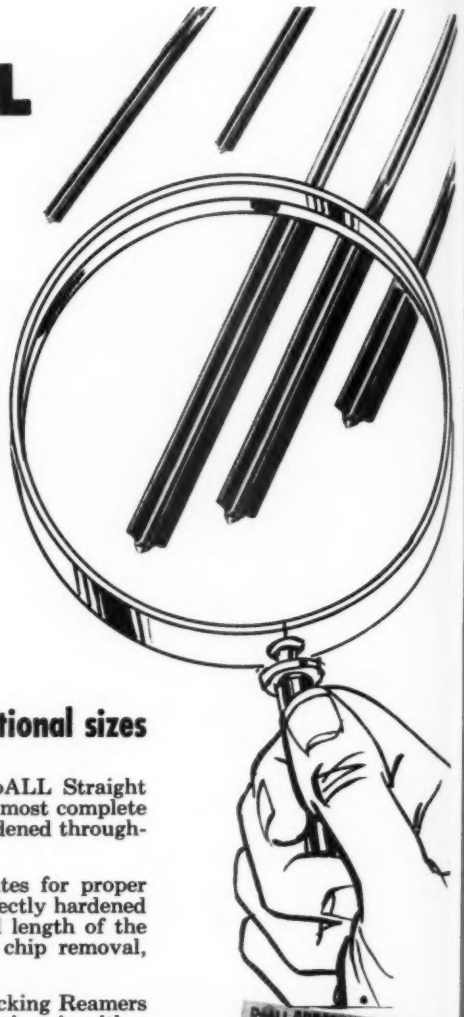
1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York • Atlanta • Cleveland • Detroit • Chicago • Dallas • Los Angeles • San Francisco

CIRCLE INFORM-A-GRAM KEY NO. 81

NEW from DoALL

STRAIGHT FLUTE CHUCKING REAMERS



MINIATURE

...in wire sizes 61 through 80 — 1/64 and 1/32 fractional sizes

Developed for the growing miniaturized products field, these DoALL Straight Flute Chucking Reamers now make DoALL's stock of reamers the most complete on the market. They're all ground from the solid, are uniformly hardened throughout, offer greater cutting ability.

All DoALL Chucking Reamers feature fine, smoothly ground flutes for proper chip disposal. Flutes are machine-ground—*on both faces*—from perfectly hardened steel. You get a perfect rake angle and flute contour—for the full length of the flute. Results: the ultimate in cutting ability, faster and cleaner chip removal, maximum service life.

Your nearby DoALL Store carries over 500 sizes and types of Chucking Reamers —in wire, letter, fractional, .001 over and under, and dowel pin sizes in either straight flute, right-hand spiral or left-hand spiral. You'll find many sizes and types as standard that other sources list as special. Try DoALL Reamers the next time you order—and see the difference.

A Complete Line of Standard Reamers

Here are a few of the many types of reamers carried by our local DoALL Sales Service Store:

D-557 Taper Shank	D-581 Die Maker's	D-534 Stub
D-542 Rose Chucking	D-521 Shell	D-586 Bridge
D-500 Hand	D-1001 Expansion	D-596 Taper
D-591 Taper Pin	D-506 Jobber's	

DoALL Reamers also available in sets—28 different assortments.

FREE—new reamer chart—for wall, desk or toolbox use. Lists DoALL Chucking Reamers ½-inch diameter and smaller by decimal size and nominal size. Get yours from your local DoALL Store.

CT-58

THIS IS A TYPICAL DoALL STORE

The DoALL Company, Des Plaines, Illinois

Call Your DoALL Service-Store

Machines and Blades · Surface Grinders · Power Saws · MACHINE TOOLS · CUTTING TOOLS · MEASURING INSTRUMENTS · SHOP SUPPLIES IN STOCK

CIRCLE INFORM-A-GRAM KEY NO. 82

MANUFACTURING MEMOS

Happy Birthday

In 40 years the Ex-Cell-O Corp. has grown from one plant begun in 1919 by a group of toolmakers, to the present 29-plant, world-wide operation.

New Divisions

Formation of a new division for the fabrication and semi-fabrication of magnesium, aluminum, and other metals was announced recently by The Dow Chemical Co. The new Dow Metal Products Co., replacing Dow Magnesium Products Dept., is headed by Hubert Fruehauf.

Scully-Jones and Co.'s new research and development subsidiary is Scully-Anthony Corp., with Myron Anthony as president.

Representatives

The J. T. Slocomb Co. has appointed The Keefer Tool & Supply Co. and The White Tool & Supply Co. to represent them in Toledo and Cleveland, Ohio, respectively.

Werner Kummert takes over as sales rep for N. A. Woodworth Co. in central New York, with headquarters in Baldwinsville.

Marshall & Huschart Machinery Co. now serves in the Chicago area for The Torrington Co.

Ferkeny & Sorensen Associates now handles Taft-Peirce gages in Detroit.

Expansion

Operations have begun at the new 15,000 sq ft addition at Dreis & Krump Mfg. Co. The new building is for machining and assembling the larger mechanical press brakes and a new line of hydraulic press brakes.

BAUSCH & LOMB
DR-25
OPTICAL GAGE

Now it's easy as A-B-C to get direct scale readings to .0001" . . . anywhere in the 0" to 3" range.

A Set part on anvil—no masters or set gages needed.

B Turn knob to lower spindle—stops automatically on contact.

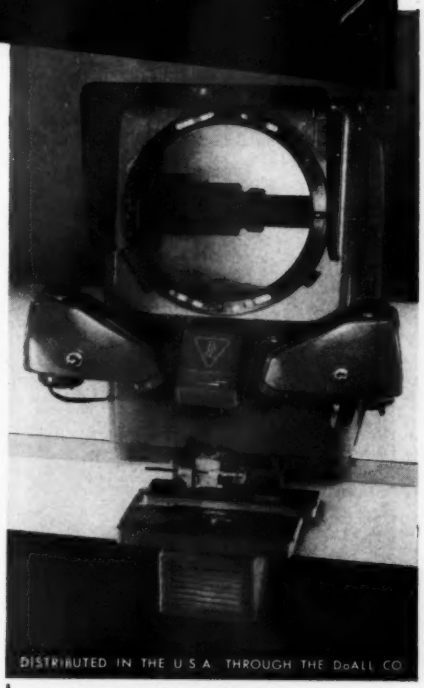
C See precise measurement at a glance—illuminated, magnified, direct-reading scale.

PRECISION MEASUREMENTS...*FAST!*

BAUSCH & LOMB
MEASURING
BENCH COMPARATOR

With the micrometer stage, the B&L Bench Comparator is the ideal tool for direct visual comparisons and for linear measurements to .0001". Now two new accessories add to its versatility:

- Protractor Ring provides quick, easy vernier readings to 5′ of arc.
- Surface Illuminator concentrates intense light on the work, exactly matching the area of each objective.



DISTRIBUTED IN THE U.S.A. THROUGH THE DoALL CO.

MAIL COUPON FOR DATA AND DEMONSTRATION

BAUSCH & LOMB SINCE 1853

BAUSCH & LOMB OPTICAL CO.
77346 St. Paul St., Rochester 2, N.Y.

☐ I want DR-25 Optical Gage Catalog D-285
☐ and demonstration
☐ I want Bench Comparator Catalog D-297
☐ and demonstration

NAME..... TITLE.....
COMPANY.....
ADDRESS.....
CITY..... ZONE..... STATE.....

CIRCLE INFORM-A-GRAM KEY NO. 83

1500° IN 5 MINUTES
2300° IN 30 MINUTES

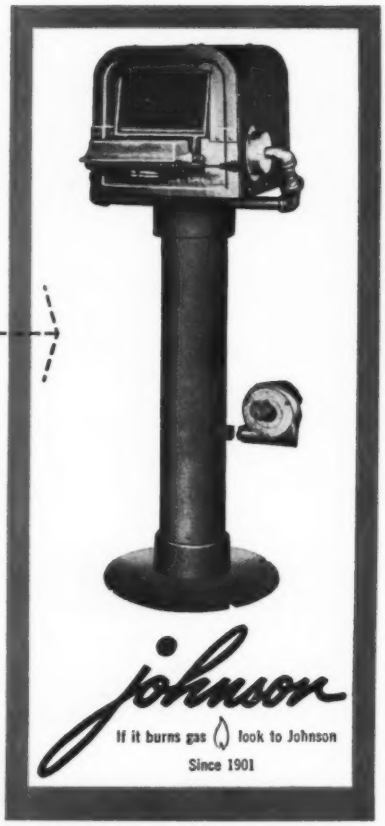
johnson

NUMBER 120 HI-SPEED FURNACE

That's the kind of quick heating action you get with this compact, powerful furnace. It's economical to operate, too. Fast heat-up saves time and gas. High-temperature insulated firebox, 5" by 7¾" by 13½", gives even hardening of high speed and carbon steel dies, tools and small parts. Temperature easily regulated. G.E. motor and Johnson Blower included. 120,000 BTUs per hour.

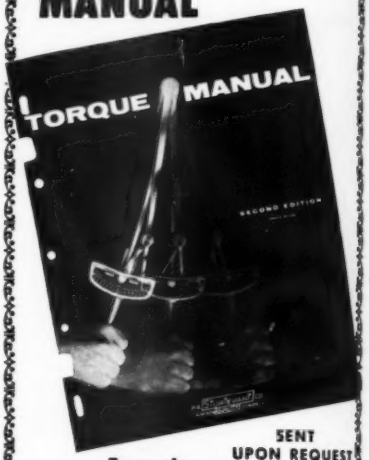
Pedestal style, F.O.B. Factory....$198.00
No. 120 also available in bench style.

Write today for free Johnson Catalog
Johnson Gas Appliance Company
873 E Avenue NW, Cedar Rapids, Iowa



CIRCLE INFORM-A-GRAM KEY NO. 841

"TORQUE WRENCH" MANUAL



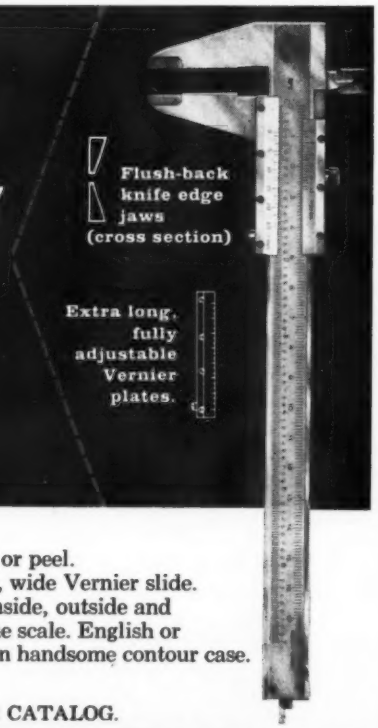
SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 843

NEW! ETALON #17 PRECISION VERNIER CALIPER



Dull chrome plated, will not chip or peel. Exceptionally easy to read. Clear, wide Vernier slide. Hardened Stainless Steel. Read inside, outside and depth measurements from the same scale. English or English and Metric combination in handsome contour case.

WRITE FOR CATALOG.

ALINA CORPORATION

122 East Second Street, Mineola, L. I., N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 842

DEPENDABLE ACCURACY

INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

SEND FOR DESCRIPTIVE LITERATURE

ACME TOOL CORP.

75 W. Broadway New York 7, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 844

MANUFACTURING MEMOS

Change of Hands

Sermax Corp. has been purchased by Hevi-Duty Electric Co., a division of Basic Products Corp., and will complete the line of electric ovens made by Hevi-Duty.

The Motch & Merryweather Machinery Co. has acquired the Modern Tool Corp. and Radial Cutter Mfg. Corp. They'll be moved to Cleveland where they'll become part of the Cutting Tool Manufacturing Division.

An agreement to purchase the assets of West Point Mfg. Co. was recently announced by Barry Controls, Inc. It'll operate as the Wespo Division of Vlier Engineering Corp., a Barry subsidiary.

Coming Events

Oct. 1-2. The Society of the Plastics Industry, Inc.'s 15th New England Section Conference, Wentworth-by-the-Sea, Portsmouth, N. H.

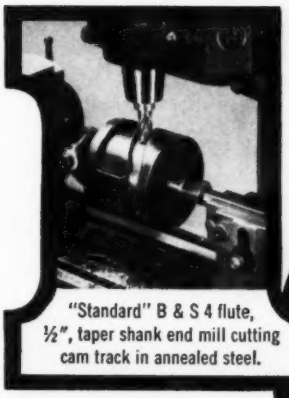
Oct. 5-9. Society of Automotive Engineers, Inc.'s National Aeronautic Meeting, Ambassador Hotel, Los Angeles.

Oct. 7-9. The Gray Iron Founders' Society's 31st Annual Meeting, Fairmount Hotel, San Francisco.

Oct. 8-10. American Society of Tool Engineers' Semi-Annual Meeting, Chase-Park Plaza Hotels, St. Louis.

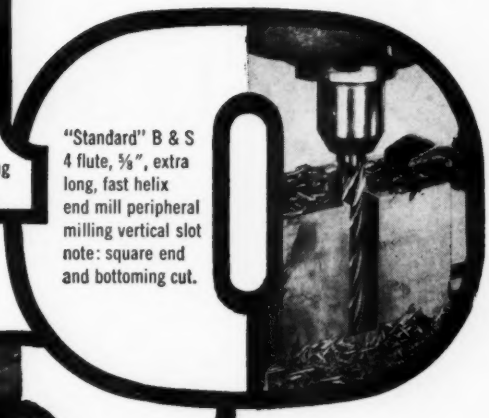
Oct. 13-14. Southern California Section of the Society of Plastics Engineers' Conference, "Plastics Engineering—State of the Art Today," Ambassador Hotel, Los Angeles.

Oct. 16-17. The American Production & Inventory Control Society's National Technical Conference & Exhibit, Hotel New Yorker, New York.



"Standard" B & S 4 flute, ½", taper shank end mill cutting cam track in annealed steel.

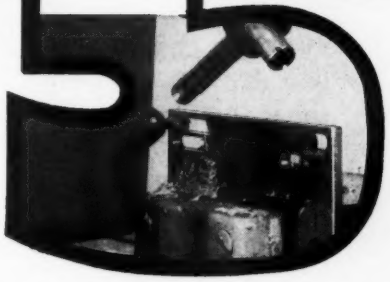
How Brown & Sharpe "STANDARD" End Mills End Wonder, Worry & Wait!



"Standard" B & S 4 flute, ⅝", extra long, fast helix end mill peripheral milling vertical slot note: square end and bottoming cut.

"Standard" B & S 2 flute, 3/16", straight shank, double end end mill cutting key slot in arbor—note: double end doubles production before resharpening.

"Standard" B & S 4 flute, ½", fast helix, double end end mill plunge cutting and slotting boiler-plate.



CHOOSE FROM 1065 DIFFERENT "STANDARD" OFF-THE-SHELF END MILLS AND PRODUCE JOBS LIKE THESE—IN THE TIME YOU USED TO WAIT FOR OTHER TOOLS!

Here are just a few of the production jobs that are completed and shipped daily—ahead of schedule—by Brown & Sharpe End Mill Users.

Rely on your Brown & Sharpe Distributor for speedy service from a stock of 1065 different end mills.

Send for the B & S "Condensalog" to: **Cutting Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.**

Brown & Sharpe

CUTTING TOOL DIVISION

HIGH SPEED STEEL CUTTERS
NELCO CARBIDE TOOLS
END MILLS

B·S

INDUSTRIAL DISTRIBUTORS · THE RIGHT BRAND OF PRODUCTION

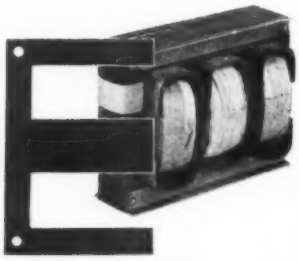
FOR THAT EXTRA EDGE IN PRODUCTION

CIRCLE INFORM-A-GRAM KEY NO. 85

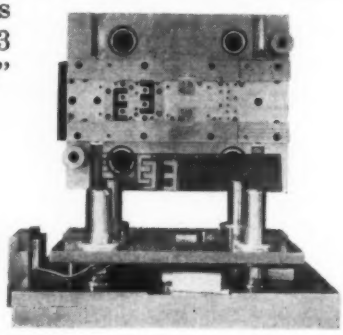
Cleveland Tool and Die
CASE FILE

"12 to 15 times longer die life"

CTD PRECISION CARBIDE DIES SPEED OUTPUT OF "FRANCEFORMER" LAMINATIONS



Check the transformer on the next neon sign you see, and chances are it'll read "Franceformer"—trade mark of the France Mfg. Co. of Cleveland, O. This aggressive company supplies leading jobbers of neon signs throughout the country. For high-speed lamination production, France chooses CTD precision tungsten carbide dies. "CTD dies give us continuous production with far less downtime", says Emil Olds, plant manager. "We get 12 to 15 times the die life at only 3 times the previous cost."



Another example of the important production efficiency made possible by CTD precision craftsmanship

Cleveland Tool and Die *means precision...*

Dies, Jigs, Fixtures and Special Purpose Tooling

Send for brochure describing CTD's plant and facilities. **FREE!**

Cleveland Tool and Die Co.
30510 Lakeland • Willowick, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 86

Taking over as sales manager for Hunt Valve Co. is **Andrew V. Ney.**

New sales manager for the Machine Tool Division of Clearing, division of U. S. Industries, Inc. is **Stephen Miller. A. R. Burke** serves as assistant sales manager.

Harold Weiss is the new manager of applications engineering in the General Electric Co.'s Computer Department.

Milton J. Kuhn is now serving as western district manager, with headquarters in Los Angeles, for Futurmill Inc.

Severance Tool Industries, Inc., has appointed **Robert H. Severance** district representative for Oklahoma, Arkansas, Texas, and Louisiana.

New appointments at Verson Allsteel Press Co. include **Walter C. Johnson,** assistant vice president of administration; **C. J. Warmac,** sales manager, Hydraulic Division; and **Paul C. Kjelstrom,** sales manager, Mechanical Press Division.

Recent promotions at The Carpenter Steel Co. include **Earl W. Dunkle,** assistant manager, alloy steel sales; **Robert E. Frederick,** assistant advertising manager; **Luther T. Miller,** manager of warehouse inventories; and **Robert J. Buttery,** general traffic manager.

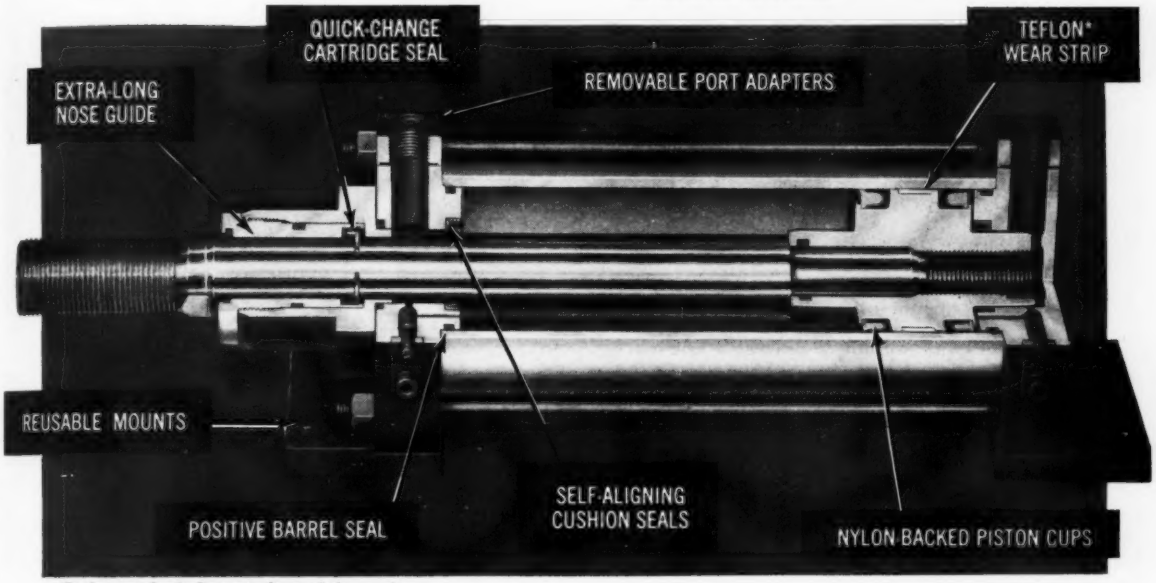
Heading the newly created Marketing Services Department at The Warner & Swasey Co. is **Baxter Fullerton. Robert L. Groves** is now administrative assistant, Sales Department.

New general sales manager of Pratt & Whitney Co., Inc., is **James H. W. Conklin.**

Former sales manager of Super Tool Co., **Lawrence A. McDonald,** has been elected vice president of sales.

new... new... new... Valvair® HEAVY-DUTY AIR AND HYDRAULIC CYLINDERS

200 psi air, 500 psi hydraulic



*Trade name for Du Pont tetrafluoroethylene resin

...will provide efficient, dependable service on your high-production equipment

A look inside shows you why Valvair heavy-duty cylinders belong on *your* high-production machines! Built by Valvair, makers of famous SPEED KING valves, these heavy-duty cylinders provide design, construction and component material features coordinated to assure efficient operation, longest service life and minimum downtime.

Whether you're ordering new machines, or modernizing equipment now in use, it'll pay you to specify Valvair heavy-duty cylinders for all your high-production machines. A full range of bore and rod sizes, interchangeable *and reusable* mountings, stroke lengths and cushioning options are available.

Call in your nearby Valvair or Bellows field engineer today . . . take advantage of one-source responsibility for all your control system needs . . . cylinders, valves, manifolds, filters, regulators and lubricators.

8038-1

For detailed information, write for Bulletin VC-800. Address Dept. TP-1059, Valvair Corporation, Akron 11, Ohio

Valvair AKRON 11, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio.

VALVAIR AIR & HYDRAULIC CYLINDERS • SPEED KING CONTROL VALVES AND MANIFOLDS • PLUG-IN CONTROL VALVES AND MANIFOLDS
HI-SPEED INLINE VALVES • PILOT VALVES • MINI-KING VALVES • MANUAL VALVES • FILTERS • REGULATORS • LUBRICATORS
CIRCLE INFORM-A-GRAM KEY NO. 87

SEIBERT FLOATING HOLDER

Compensates For Misalignment Of Tool And Hole

• ECONOMICAL
• CONVENIENT
• EFFICIENT
Continues to Float Freely when Tool is at Work
MORSE TAPER SHANK — Others available.
EXTRA BEARING CAPACITY—Withstands heavier thrust loads.
COLLET-CLOSING RING—Provides for quick tool changes.

This holder, one of a long line of SEIBERT fine machine-tool accessories, provides a full float to compensate for misalignment of hole and tool when such operations as drilling, tapping, and reaming are performed. It also provides for holding close tolerances, it eliminates much downtime, and it permits quick tool changes. The float in all directions is not hampered by friction or binding in the driving mechanism.

HEAVY-DUTY DESIGN ASSURES LONG LIFE

The heavy-duty design provides extra bearing capacity to assure long life, and the positive lubrication practically eliminates wear and parts replacement. All types of shanks are available in a range of sizes, including an adjustable adapter shank.

Send for complete specifications and price information.

SEIBERT

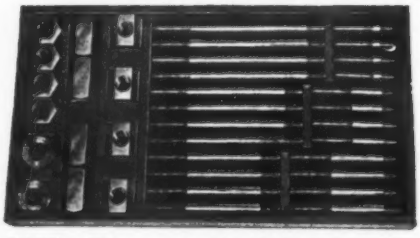
SEIBERT & SONS, INC. 1012 E. 24th STREET CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 881

REID Tool Room NEEDS

HANDY SET-UP STUD SETS



Available in 12 different sets in wide range of sizes. Each set contains 24 studs, 4 each of T-Nuts, Coupling Nuts, Hexagon Nuts and Washers. Each item also obtainable separately.

FREE—78 page catalog listing scores of needed items for tool room. Address

REID TOOL SUPPLY COMPANY
MUSKEGON HEIGHTS, MICHIGAN

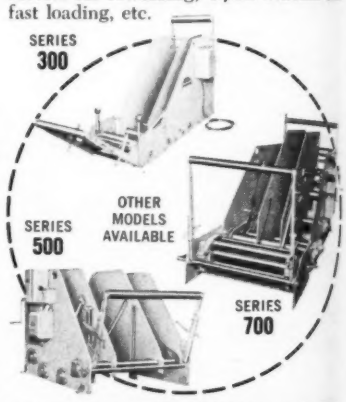
CIRCLE INFORM-A-GRAM KEY NO. 882

why pull against heavy coil weights

when it's so easy to draw from this slack loop!

Benchmaster Koil-Kradles form a slack loop from which any type of machine can effortlessly draw *without pulling against the weight of a heavy coil!* A complete range of Koil-Kradles sizes now cover coil capacities to 20,000 lbs. and stock widths up to 50 inches!

All Benchmasters are economically priced, yet contain such important features as *Fully-Powered and Hardened Rolls, Anti-Friction Bearings, Strutted Frames, Fast Loading Pinch Rolls (standard equipment on many models), Variable Time Delay* for reducing intermittency of operation, *Adjustable Guide Plates, Reversible Motors* for rewinding, *Open Throats* for fast loading, etc.



Also available: BENCHMASTER STRAIGHTENERS, KOIL-KRADLE-STRAIGHTENER COMBINATIONS, and COMBINATION FEEDING MACHINES.

WRITE FOR DESCRIPTIVE CIRCULARS *on all Benchmaster press room equipment. Describe your job for personal recommendations!*

benchmaster

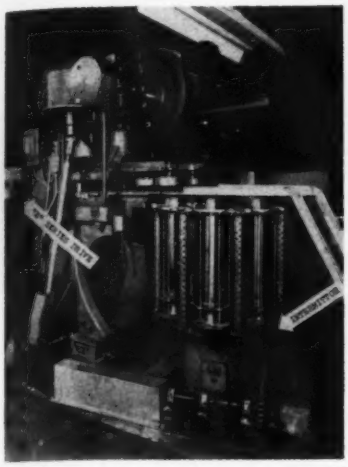
World's largest manufacturer of steel plate presses and mills

1835 West Rosecrans Ave. • Gardena, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 883

Cam Indexing Jumps Output 50%

Production of oil filter laminations on a punch press increased 50% after installation of a cam indexing drive and an Intermittor index table, products of the Ferguson Machine Corp. of Indiana, St. Louis, Mo.



The material, 6¾" x 1/16" cellulose felt, is fed into the press by rolls in increments of 6¾". Parts are blanked out on the down stroke, pushed back into the strip by springed pads during upward stroke, and carried out of the blanking station. Following advance of the material, a secondary die extending from the press ram performs another operation after which pieces are ejected into eight stacking magazines placed on the high speed, precision indexing table.

The E Series Ferguson drive with a feed stroke of 210° permits operation of the press at 90 strokes/min with great accuracy of feed. On the output shaft of the index table is a fixed gear which engages gears mounted on the magazine holding fixtures. As the table indexes, each magazine rotates approximately 45° to stagger filter laminations in relation to each other. When magazines are filled, stacks are removed and encased in retainers to form a complete filter unit.

Specify the

T-J Spacemaker

for longer, more efficient cylinder service

You too—can reduce replacement expenditures—lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space . . . and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities . . . air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.

WITH EXTRAS . . . AT NO EXTRA COST

1. METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
4. ONE PIECE PISTON assures better alignment, longer bearing and packing life.
5. FORGED SOLID STEEL HEADS throughout entire line.
6. PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
7. NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
8. STREAMLINED DESIGN . . . operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.

T-J TOMKINS-JOHNSON
RIVETORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHERS

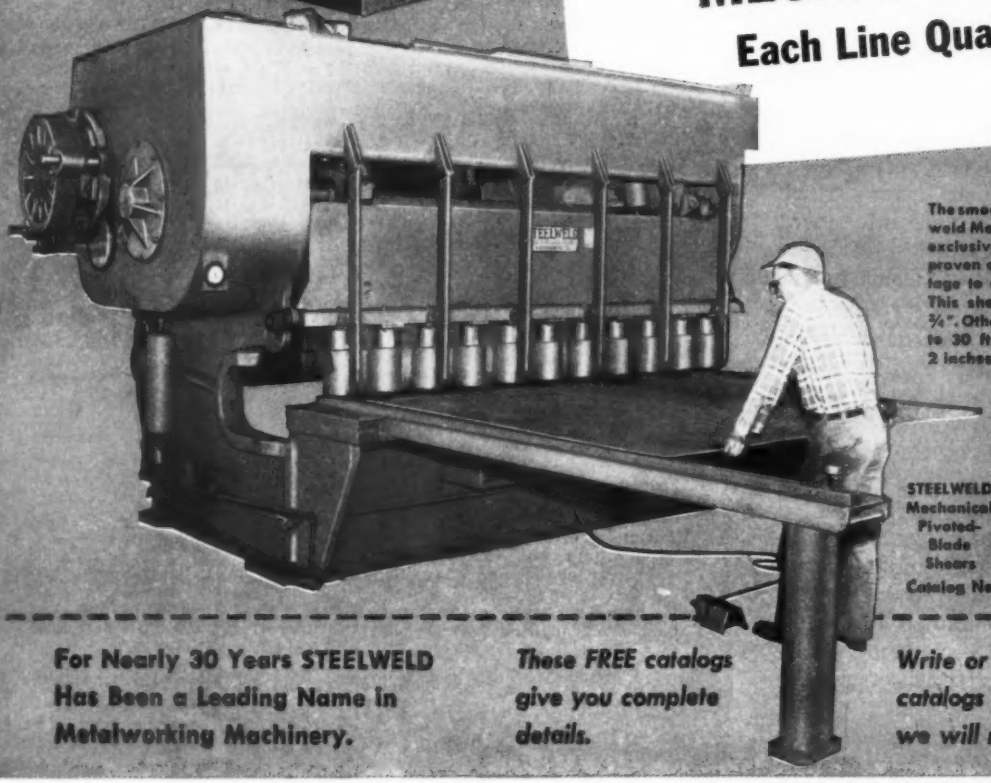
CIRCLE INFORM-A-GRAM KEY NO. 89

Large numbers of Steelweld Mechanical Press Brakes are in operation in the United States and throughout the world. This machine is rated for 8' x ⅜", but has 12-ft bed and ram. Sizes available to 2000 tons for forming lengths to 30 feet.

STEELWELD Mechanical Press Brakes
Catalog No. 2023

STEELWELD MECHANICAL and Offers HYDR

Each Line Quality Built for Lo



The smooth operation of Steelweld Mechanical Shears with exclusive pivoted-blade has proven a tremendous advantage to a great list of users. This shear is rated 10'-0" x ¾". Others available for plate to 30 ft. and thicknesses to 2 inches.

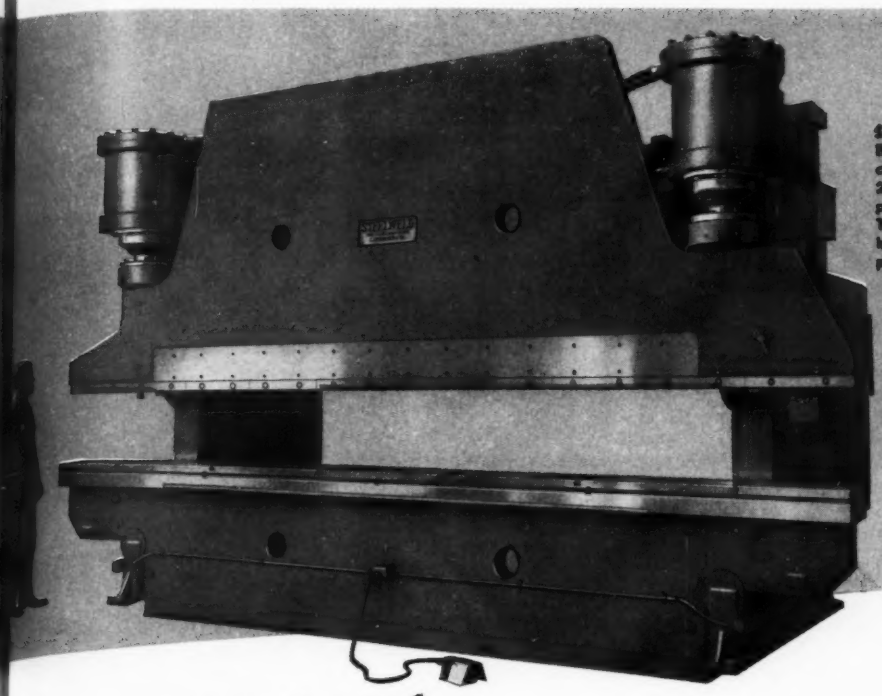
STEELWELD Mechanical Pivoted-Blade Shears
Catalog No. 2011

For Nearly 30 Years STEELWELD Has Been a Leading Name in Metalworking Machinery.

These FREE catalogs give you complete details.

Write or phone for catalogs desired, and we will rush them to y

STEEL



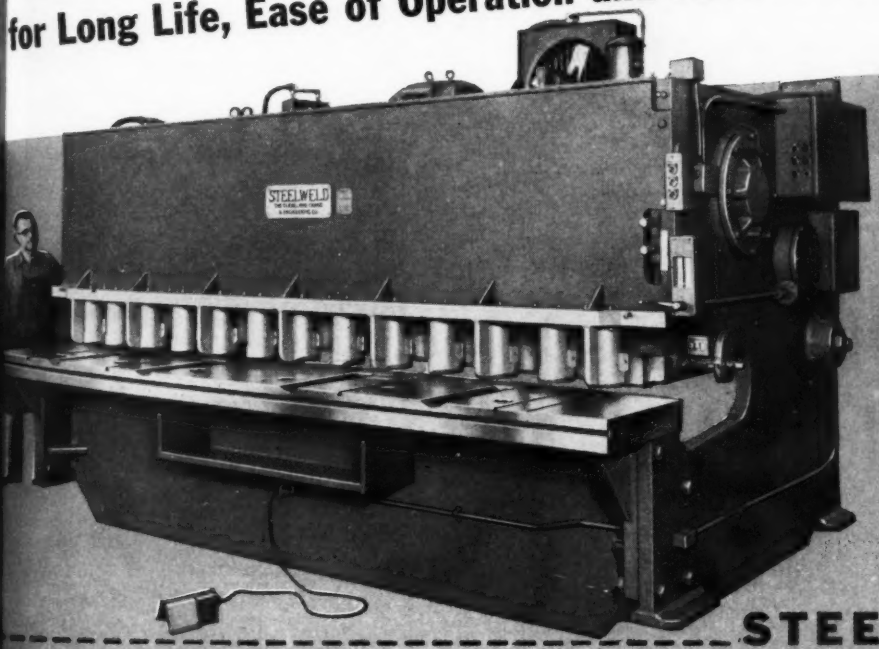
Steelweld Hydraulic Press Brakes are available in capacities from 200 to 2000 tons for working plate in lengths to 30 feet. The picture is of a 500 ton brake that will form steel plate up to 20' x 1⅛".

STEELWELD Hydraulic Press Brakes
Catalog No. 2024

Offers Complete Lines of

HYDRAULIC PRESS BRAKES and SHEARS

for Long Life, Ease of Operation and Finest Performance



Steelweld Hydraulic Shears have two remarkable features not available on any competitive machine: Single-cylinder drive and pivoted-blade cutting action. The shear shown here handles plate to 12' x ½". Other sizes go to 30 feet and for plate thicknesses to 2 inches.

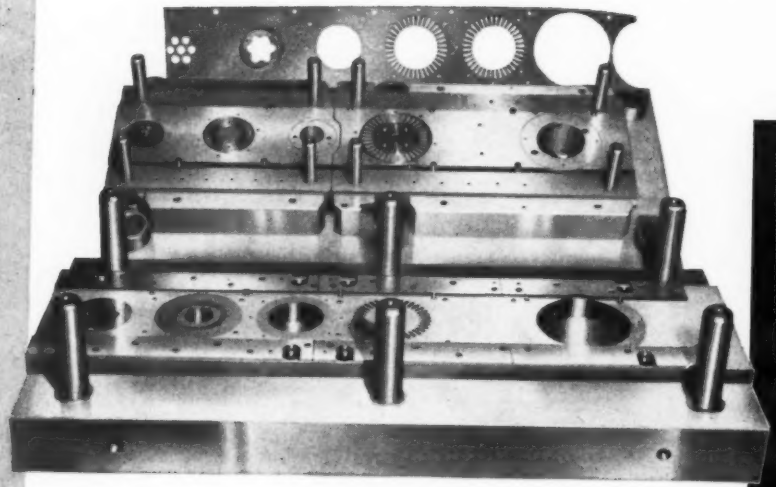
STEELWELD Hydraulic Pivoted-Blade Shears
Catalog No. 2030

STEELWELD
Mechanical and Hydraulic BRAKES and SHEARS

STEELWELD MACHINERY DIVISION
The Cleveland Crane & Engineering Co.
8778 East 281st St., Wickliffe, Ohio

STEELWELD Machinery also includes One-, Two- and Four-Point Straight-Side Presses and Speed-Draw Presses.

CIRCLE INFORM-A-GRAM KEY NO. 91



CARBIDE DIES

designed and built by

Lamina®
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

WE WOULD BE PLEASED TO QUOTE ON YOUR REQUIREMENTS

CIRCLE INFORM-A-GRAM KEY NO. 92

Standard Drill Heads Do Tricky Machining

Standard drill head and feed components are used by Zagar, Inc., 23894 Lakeland Blvd., Cleveland 23, to machine a gun part which might otherwise require intricate machinery. The machine has two basic machining stations with six machining units consisting of one horizontal, one vertical, and one inclined head to each station.

At the first station, the gun part is drilled simultaneously from the inclined, vertical and rear horizontal units. The air shuttle-operated table moves back to the second station where one hole is tapped from the 15° inclined unit, four tapped by the vertical head, and one hole back counter-bored from the rear horizontal unit.

Cycle of operation is automatic after loading and unloading the machine. Hole range is from 0.116" to 0.404" with holes as close as 0.250" from center to center. The machining heads are fed by individual cam-controlled drill units.

Deaths

Raymond L. Higgins, 63, sales executive of Yale Materials Handling Division for 37 years, died July 11 at Glencoe, Md.

Erwin Loewy, founder and head of Loewy-Hydropress and vice president of its parent company, the Baldwin-Lima-Hamilton Corp., died July 13 at Beekman-Downtown Hospital, New York.

William H. Gallmeyer, 76, president and treasurer of Gallmeyer & Livingston Co., died of a heart attack at his summer home on July 25.

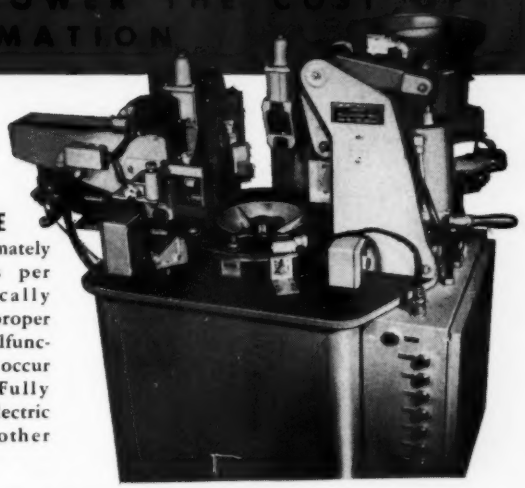
Albert F. Wall, 68, a chairman of the board of Wall Colmonoy Corp., died Aug. 3 in Detroit.

Alfred Kauffman, former president of Link-Belt Co. and a director for 37 years, died Aug. 7 in Chicago at the age of 79.

Specify

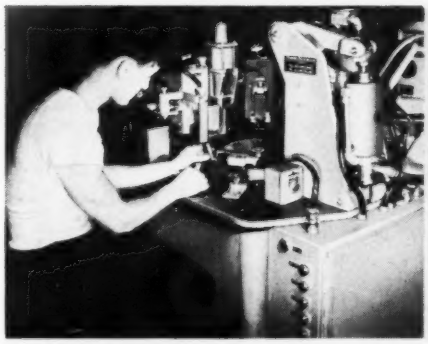
Standard Tool "building blocks"

AND LOWER THE COST OF AUTOMATION



8-STATION ASSEMBLY MACHINE produces approximately 1500 assemblies per hour, automatically indicates any improper loading or any malfunction which might occur at any station. Fully equipped with electric interlocks and other safety devices.

Rockwell Manufacturing Co., Hopewell Division, now automatically assembles 4 different size double ball check assemblies of two types with a machine designed and built by Standard Tool and Manufacturing Co. incorporating a model ST-A9A indexing unit, Standard Cabinet base, and other precision "building block" components.



OPERATOR MANUALLY LOADS ball check body at **Station 1** (All other operations are completely automatic.) **Station 2** Small ball is loaded. **Station 3** Impact tool forms ball seat. **Station 4** Larger ball is loaded. **Station 5** Impact tool forms larger ball seat. **Station 6** Pin is inserted to hold assembly, or, **Station 7** Top of body is crimped. **Station 8** Completed ball check assembly is ejected.

Changeover from one size or type to another is quickly accomplished and simplicity of design makes it foolproof.

The heart of this Automatic Machine is the ST-A9 indexing unit available in many sizes and types to meet most rapid assembly and manufacturing needs.

Technical Booklets Sent on Request!

Standard Tool engineers will be pleased to help you in selecting the indexing unit to meet your exact requirements.

Also ask for Standard Tool facilities brochure.

Machinery Division

STANDARD TOOL & MANUFACTURING CO.

Better Products at Lower Costs thru Better Methods

252 LAUREL AVENUE **KEARNY, NEW JERSEY**

STANDARD TOOL AUTOMATION

Since 1910

CIRCLE INFORM-A-GRAM KEY NO. 93

"MODULE" power units can make your machining operations more profitable with the—

Three Way Savings

1 *Accuracy*
spindle speeds
feed speeds
held tolerances

2 *Dependability*
low maintenance
indestructability

3 *Versatility*
"Module" construction
interchangeability
multi-operations

59
"Self-Contained"
"MODULE"
power units

DRILLMATION, INC.
6500 E. ELEVEN MILE RD.
CENTERLINE, MICHIGAN
JEfferson 9-2030

CIRCLE INFORM-A-GRAM KEY NO. 94

Rotary Unit Handles 3 Intake Manifolds

A new Snyder special 5-station rotary index machine mills, drills, countersinks, spotfaces, and taps the carburetor pads in three different truck engine intake manifolds. At capacity, it produces 109 pcs/hr.

To handle this variety of parts, three different design methods are used: a two-position drill unit with two-position single-spindle drill head, interchangeable pot heads, and a two-spindle tap head with one spindle used at a time for a part.

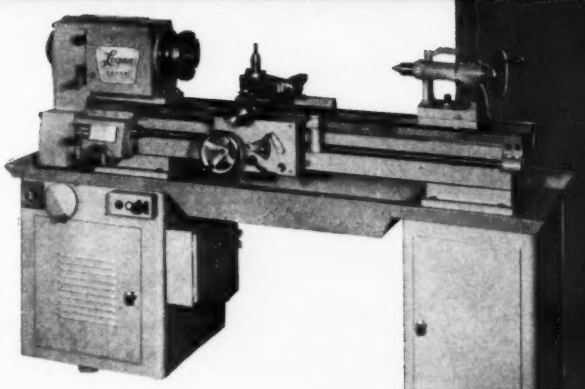
The machine is an assembly of modulized components, including a 60" dia fluid drive indexed table, wing bases, vertical columns, way-type slide units, milling heads, drill heads, and tapping heads with lead-screw drives. A separate motorized unit provides power for the hydraulically-operated, electrically-controlled machine.

Fast Press Brake

At Quaker Stretcher Co., Kenosha, Wis., 960 TV trays/hr are drawn, trimmed, and finished on a single 150-ton hydraulic press brake. Contrasted to three single-operation mechanical presses, the hydraulic setup on the 36" x 8' platen features partial draw on the first die, shearing two trays and finished draw on the second die, and putting bead on reverse draw edge on the third die. Shockless hydraulic operation eliminates previous periodic breakdown of 80 blankholder springs. Thus, a single press reduces machinery investment and lowers materials handling costs. Get details from Pacific Industrial Mfg. Co., 848 49th Ave., Oakland, Calif., or Circle Inform-A-Gram No. A3.

its specifications add up to high production capacity

Logan 14" Lathe



Logan No. 6565 14" Lathe

Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

- An oversize spindle with 1⅝" bore turns on four super-precision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

- Spindle speeds to 2000 rpm
- 1½" Levermatic collet chuck capacity
- 14⅝" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

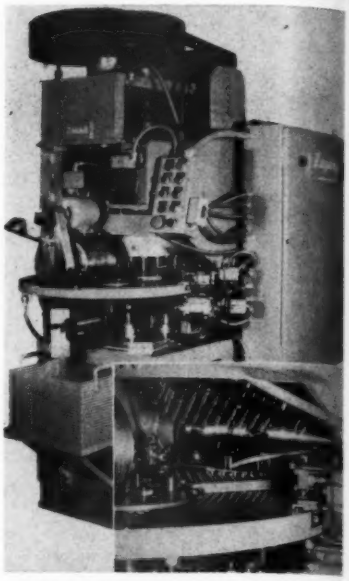
LOGAN ENGINEERING CO. Dept. M-1059, 4901 Lawrence Avenue, Chicago 30, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 95

Speedy Nut Tapper Is Fully Automatic

Accuracy and high production are combined in a new automatic nut tapping machine which can produce up to 50,000 nuts/hr. Designed and built by Zagar, Inc., it has flexible tooling which can accommodate nuts ranging in pitch from 8-32 to 1"-8. Another feature is lead screw control of the head with all taps rotating simultaneously.

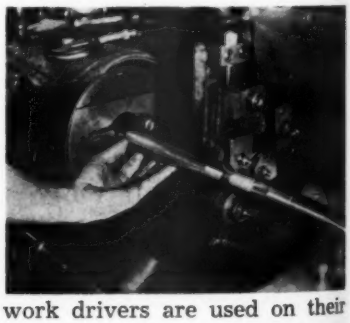
In operation, nuts are placed in a hopper which feeds to one of six sections of a circular index-feed plate. The nuts are brushed at the second section for



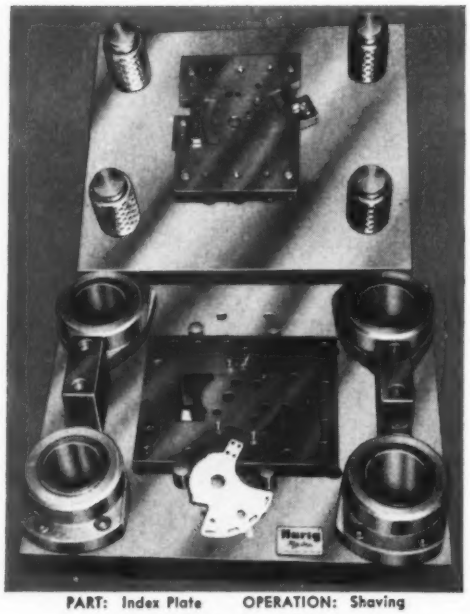
positioning flush with the top of the locator plate. They are agitated at Station 3 to orient them firmly in the locator holes, and at Station 4 they are locked in the plate. Tapping at the next station and unloading at the final position complete the operations. For details, Circle Inform-A-Gram No. A4.

Work Drivers Boost Lathe Production

Self centering work drivers which eliminate the need for dogging are used by Gould Pumps, Inc. to save 0.36 min/pc in turning pump shafts. The Seneca Falls Machine Co.'s



work drivers are used on their automatic lathes and only two different slides are needed to turn the full range of shaft diameters. Angular serrated jaws provide positive quick grip on stock.



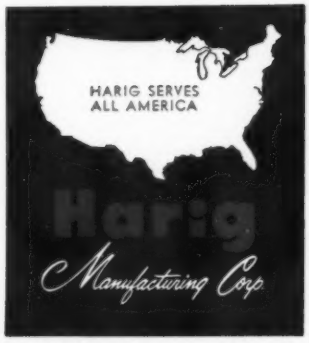
PART: Index Plate OPERATION: Shaving
MATERIAL: .063 C.R.S.

ARE YOU OVERLOOKING A HARIG CARBIDE DIE APPLICATION?

HARIG CARBIDE DIES ARE THE LOGICAL ANSWER TO LOW COST–HIGH PRODUCTION RUNS!

Leading manufacturers are turning to Harig Carbide Dies for forming, drawing, shaving and notching in addition to blanking and piercing applications . . . because they *consistently* out-produce steel dies 10-15 to 1 (fewer grinds mean reduced maintenance and set-up costs), yet cost about ½ more than steel. On long stamping runs, one Harig Carbide Die can take the place of several steel dies — at a great savings to you.

We would be pleased to consult with you on your next tooling program and suggest either Harig Carbide or Steel Dies to fit your needs.



WRITE FOR CATALOG

5761 W. HOWARD ST., CHICAGO 31, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 96

Book Reviews

STANDARD WELDING SYMBOLS. Published by American Welding Society, 33 W. 39th St., New York 18, N. Y., 1958. 87 pages, paperbound, $3.

This revised standard includes new welding symbols for recently developed processes and new types of welds, including spot and seam welds made by arc welding, and welds used in aircraft, missile, automotive, and structural steel fabrication. A handy chart gives basic symbols at a glance, and a table presents a new system for designating processes by letters.

AIDS TO WORKSHOP PRACTICE, by C. T. Bower. Distributed by The Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 1958. 192 pages, $3.75.

Helpful hints, ideas, and gadgets for engineering workshops are presented in this clearly written, well-illustrated book. Many of the ideas deal with better ways of using ordinary hand tools, small power tools, drilling machines, and small center lathes. Tips on maintenance of tools and machines are also included. Many of the time-saving machine and tool modifications described are inexpensive and easy to make.

HANDBOOK OF PRACTICAL ELECTROPLATING, by Thomas M. Rodgers. Published by The Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 1959. 333 pages, $8.50.

Plating solutions and equipment and their application are thoroughly covered in this book. Topics, presented in alphabetical order, range from Acid Dipping to Zirconium Plating. Step-by-step procedures for plating, cleaning, or coloring metals and other materials are outlined with emphasis on practical shop uses.

CLAUSING COLCHESTER GEARED-HEAD LATHES

HERE'S PROOF OF PERFORMANCE *from Anderson Duggar, Jr., president of Equitable Engineering Co. — "How do we like our Clausing 15" geared-head lathe? We want another just like it! Our people really surveyed the market thoroughly before deciding on the Clausing — believe me, it's everything it looked to be and more. The Clausing is an extremely accurate lathe and its features and ease of operation are making us money."*

Clausing geared-head lathes do lead their field in capacity, performance and value. Here's why:

They're bigger in capacity than other lathes in their class. Larger spindles, larger thru-hole capacity, larger bearings for heavier work. 17" lathe spindle, for example, has 3-1/16" thru hole — 15" lathe, 2-1/16" hole — 13", 1-9/16" hole.

Have heavy-duty construction throughout. Bed ways are induction hardened. Gears in head and quick-change box run in bath of oil. Power feeds are taken from separate feed rod, lead screw is used for thread cutting only. Spindles are high-tensile steel.

Built for precision performance — to American standards of toolroom lathe accuracy. Have Gamet Micron tapered roller bearings with oil flow lubrication — the most advanced and accurate bearings known to industry.

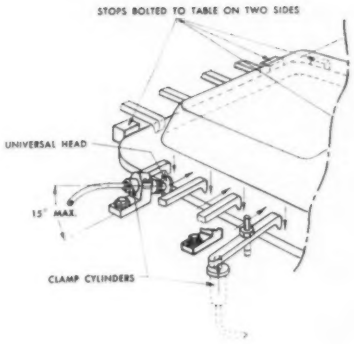
Each is an outstanding value. 13" cabinet base models, including motor and controls, start at $2302; 15" cabinet base at $3221; 17" at $5070. You owe it to yourself to investigate before investing in *any* lathe.

Lathe Capacities: 17" lathe: 54" and 78" centers, 28" swing in gap; 15" lathe: 30" and 48" centers, 24" swing in gap; 13" lathe: 24" and 36" centers, 18" swing in gap.

CLAUSING DIVISION *Write for Free Literature*
ATLAS PRESS COMPANY
10-115 N. Pitcher St. • KALAMAZOO, MICHIGAN
See us at the National Metals Show, Chicago, Nov. 2-6, Booth No. 1550, International Amphitheatre.
CIRCLE INFORM-A-GRAM KEY NO. 97

One Control Works Hydraulic Clamps

Instant, simultaneous or sequence clamping of up to 120 points is done from one control using the standard hydraulic clamp assemblies and fixture components discussed in Newton Hydraulic's revised catalog. Because the components are relatively inexpensive, simple to use, and standard stock items, they make hydraulic tooling economical for short and intermediate runs. The illustration shows just one arrangement.



Design and installation instructions and numerous drawing templates of this self-contained system are included in the catalog. Suggestions for tubing installation are also given. For Catalog 2, write Newton Hydraulic Tooling Co., Auburn, Mass., or Circle No. A5.

Eclipse
CUTTING TOOLS
are
"Engineered for You!"
For almost half a century ECLIPSE has engineered and produced quality cutting tools. These years of leadership in the field guarantee the superiority and dependability of all ECLIPSE products. For longer tool life, finer finishes and better all-around performance, look to the symbol of perfection.
• H.S.S. CUTTERS • T.C.T. CUTTERS • CORE DRILLS
• BACK SPOTFACERS • MULTI-DIAMETER CUTTERS
• INSERTED BLADE CUTTERS • PORT CONTOUR CUTTERS
WRITE FOR CATALOG 51
ECLIPSE COUNTERBORE COMPANY
1600 BONNER AVE., DETROIT 20, MICHIGAN
CIRCLE INFORM-A-GRAM KEY NO. 98

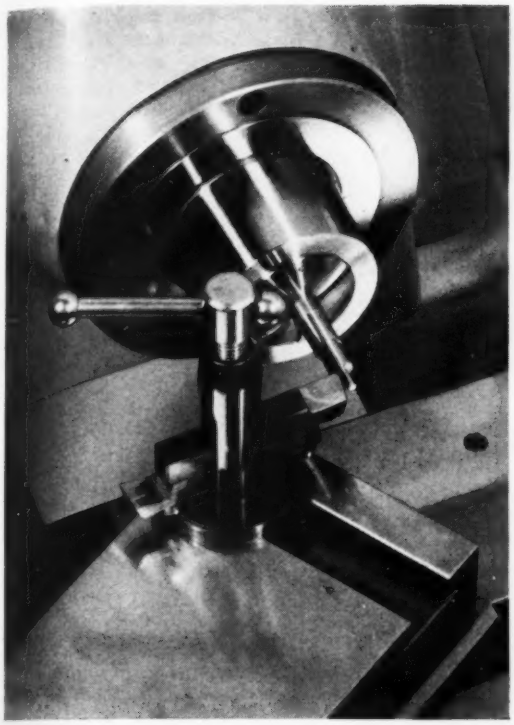
Missile Part Accurately Turned

Turbine housing assemblies for missile auxiliary power units receive close tolerance machining at H & R Manufacturing Co.

A tough stainless steel precision casting with a high nickel

and chrome content, the part requires accuracy of less than 0.001″ on 4″ diameters, surface finish as low as 32 rms, and concentricity requirements of less than 0.002″ tir.

A total of 14 separate production turning operations are involved, handled in four chuckings (two rough and two finishing), using carbide and high speed tools on a Warner & Swasey #3 Universal turret lathe. The workpiece is held in a special face plate adapter during finishing operations.



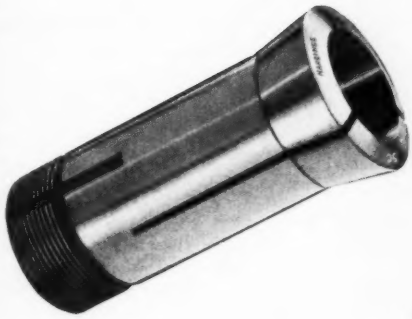
When

ACCURACY

REALLY COUNTS

SPECIFY:

HARDINGE



PRECISION DRAW-IN COLLETS

FOR YOUR

LATHES-MILLERS-GRINDERS

CARRIED IN STOCK FOR PROMPT DELIVERY IN:

Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Seattle, Portland, Minneapolis, Oakland, St. Louis, Toronto.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 99

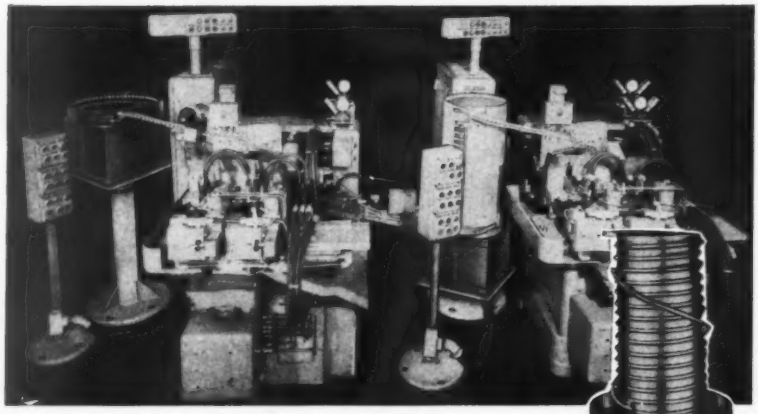
Catalogs and other helpful literature

"Titanium Machining Techniques" is a 32-page manual that outlines the do's and don't's for successful turning, milling, drilling, tapping, and grinding of titanium. Get copy from Titanium Metals Corp., or Circle No. C1.

Cut Die Replacement Costs by 50% using the Type CJ hole punching units described in a new bulletin. Dimensions for several models are included. Catalog CJDB available from Wales-Strippit, Inc., or Circle No. C2.

SYNTRON Transfer & Storage

PARTS FEEDERS



reduce costs—increase production
reduce manual inter-process parts handling

SYNTRON Transfer & Storage Parts Feeders provide an automatic link between process operations. They automatically receive, store, orient and discharge parts at a controlled rate from one operation to another. Parts may be received at one level and discharged at another—conveyed either up or down spiral as desired. Rate of parts flow is instantly controllable to operational demands.

Simplicity of design-working on an electromagnetic principle eliminating mechanical wearing parts means dependability and low maintenance.

Reduce costs—increase production, eliminate tote box storage and manual parts handling, save floor space with SYNTRON Transfer & Storage Parts Feeders.

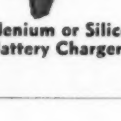
Write for descriptive literature today.

SYNTRON COMPANY
341 Lexington Avenue Homer City, Penna.

Other SYNTRON Equipment of proven dependable Quality

Lapping Machines

Parts Feeders



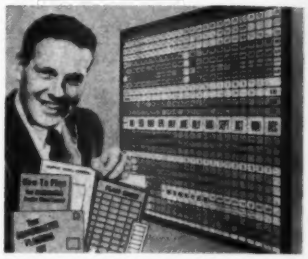
Selenium or Silicon Battery Chargers

CIRCLE INFORM-A-GRAM KEY NO. 100

A New 26-Page Booklet, covering the Gisholt Masterline No. 12, 12V, and 24 automatic production lathes, completely illustrates each machine. Features, specifications, and accessories are included, and 25 actual job applications are shown in Form 1213 to demonstrate the versatility of these sturdy, economical machines. Gisholt Machine Co., or Circle Inform-A-Gram No. C3.

"A Panorama of Production Ideas" has 16 pages of examples of ways Bellows air motors and other controlled-air-powered units are used in various plants to cut costs and increase productivity. Write The Bellows Co., for Bulletin ML-5, or Circle No. C4.

A Planning Kit contains many suggestions for picturing facts graphically for production, inventory, and maintenance control. It's available from Graphic Systems, or Circle Inform-A-Gram No. C5.



Pipe Thread Fittings for pneumatics are the subject of a bulletin that describes applications and installation procedures. Tru-Seal Div'n, Flick-Reedy Corp., or Circle Inform-A-Gram No. C6.

Special Aluminum Stock Products are listed in a bulletin. Specifications are given for extruded solid rounds, rolled sheet and plate, and extruded rectangles. Ampco Metal, Inc., supplies copies, or Circle Inform-A-Gram No. C7.

Isolate Vibration, reduce noise and shock, using the shock and vibration isolators described in a bulletin. Complete descriptions and dimensions given. Get Bulletin 59-04 from Barry Controls Inc., or Circle Inform-A-Gram No. C8.

A New Delta 20" Band Saw's features, dimensions, advantages, and applications are described in a bulletin from Rockwell Mfg. Co., Delta Power Tool Div'n, or Circle No. C9.

Gun Drills for finishing holes in one operation are detailed in a bulletin. Specifications and advantages discussed. Eldorado Tool & Mfg. Corp., or Circle No. C10.

Catalogs . .

New Miracle Movement Dial Indicator line is described in a bulletin that explains advantages, models, and specifications. Federal Products Corp., or Circle No. C11.

A Low-Cost Drill Unit that features ruggedness, versatility, and precision is described in a bulletin. Get your copy from Burklyn Co., or Circle Inform-A-Gram No. C12.

Dust Control Information and data on eight cyclone dust separators are covered in a bulletin. Get a copy from Torit Mfg. Co., or Circle Inform-A-Gram No. C13.

Easily Select Abrasive Material from a new catalog containing dimensions and data on barrel finishing equipment and supplies. Get copy from Tumb-L-Matic, Inc., or Circle No. C14.

For Cleaning and Preparing Metal Surfaces, use the helpful data in the new 32-page handbook which covers basic data, methods, and equipment. Equipment Div'n, Magnus Chemical Co., Inc., or Circle Inform-A-Gram No. C15.

High Strength High Temperature Steels are discussed in a new 32-page brochure that gives technical data on heat treatment and physical and mechanical properties of two types. Universal-Cyclops Steel Corp., or Circle Inform-A-Gram No. C16.

Directional Control Valve data sheets contain engineering and design information on the operation and function of 94 models of two- and four-way hydraulic Spherotor valves. Get copies from Sarasota Precision Products, or Circle Inform-A-Gram No. C17.

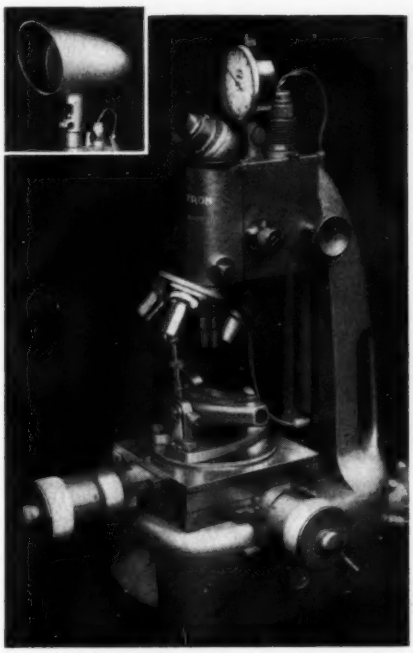
"Modern Principles of Heat Treatment of Steel" has 28 pages of data on step-annealing, martempering, and austempering. It has diagrams for most popular tool steel grades. Copies available from Uddeholm Co. of America, Inc., or Circle No. C18.

Automatic Liquid Spray Buffing is discussed in a 16-page manual, which gives materials on recommended abrasive grades and includes drawings of typical layouts and equipment. The Lea Mfg. Co., or Circle No. C19.

The Avoidable Costs Replacement Formula is set up in a revised booklet that explains J & L's improved method for appraising the productivity of machine tools and similar capital equipment for replacement purposes. Write Jones & Lamson Machine Co., for your copy, or Circle No. C20.

"Firthite Mechanical Toolholders and Throw-Away Inserts" gives specifications for different styles and includes detailed diagrams. Catalog MTI-5 available from Firth Sterling, Inc., or Circle No. C21.

MEASURE TO 0.0001" IN 3 DIMENSIONS WITH UNITRON'S TOOLMAKERS MEASURING AND METALLURGICAL MICROSCOPE



The UNITRON Model TM is more than just a measuring microscope. It is the only instrument which combines in one stand a completely equipped toolmakers microscope for precise measurements — LENGTH, WIDTH and DEPTH, and a metallurgical microscope for examining the structure of polished metal samples under high magnification.

NOTE THESE QUALITY OPTICAL & MECHANICAL FEATURES

- **Objectives:** achromatic, coated, 3X, M10X, M40X. **Eyepiece:** coated Ke10X with crosshair.
- **Magnifications:** 30X, 100X, 400X; up to 2000X with accessories.
- **Focusing:** Both dual control rack and pinion coarse and micrometer-screw type fine adjustments. Body has locking device.
- **Three illuminators:** sub-stage, surface and vertical, have variable intensity.
- **Combination Stage:** rectangular ball bearing with linear measurements to 0.0001" and rotary measurements to 5' with vernier. (Metric model available on special order.)
- **Depth Indicator:** measures in units of 0.0001" by "optical contact" with specimen.
- **Projection Screen:** available as accessory for optical comparison.
- **Eyepiece Turret:** available as accessory for measuring surfaces, radii, thread pitch etc.

In fitted hardwood cabinet

$1050 FOB Boston

UNITRON
INSTRUMENT DIVISION of UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASS.

UNITRON'S OFFER:
a 10-Day trial of a TM in your plant — without any cost or obligation.

Please rush to me, UNITRON's Microscope Catalog. 51-V
Name
Company
Street
City State

THE TREND IS TO UNITRON

THE TREND IS TO UNITRON

CIRCLE INFORM-A-GRAM KEY NO. 101

Catalogs . . .

A New Electronic Tracer is subject of a bulletin. It shows how simple pencil line sketches of intricate shapes and forms can be used to guide oxygen shape-cutting machines with the new tracer. Write Linde Co., Div'n of Union Carbide Corp., for your copy, or Circle Inform-A-Gram No. C22.

Five Furnace Bulletins from Sunbeam Equipment Corp. give dimensions and applications of a variety of furnace types. For:

"Atmosphere Generators," Bulletin SEC-G1, Circle No. C23.

"Bell-Type Furnaces," Bulletin SEC-2, Circle No. C24.

"Box-Type Electric Furnaces," Bulletin SEC-3, Circle No. C25.

"Box-Type Fuel Fired Furnaces," Bulletin SEC-4, Circle No. C26.

"Pot-Type Furnaces and Fuel-Fired and Electric," Bulletin SEC-5, Circle No. C27.

SMART TOOLING

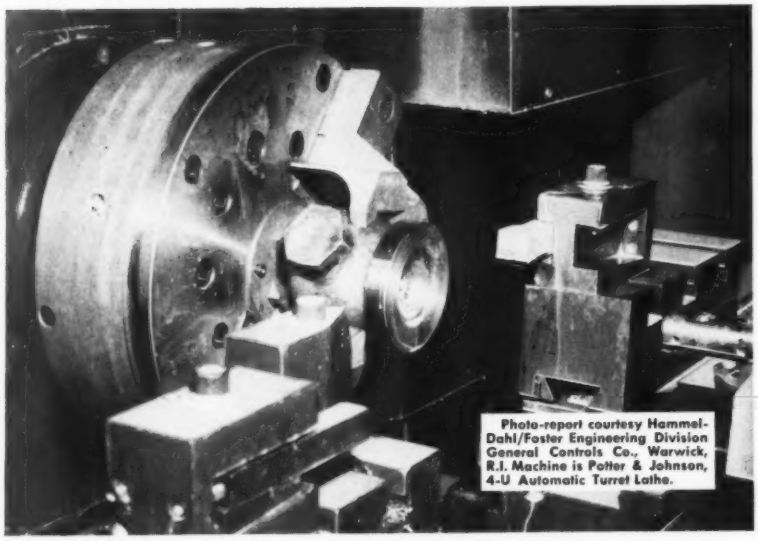


Photo-report courtesy Hammel-Dahl/Foster Engineering Division General Controls Co., Warwick, R.I. Machine is Potter & Johnson, 4-U Automatic Turret Lathe.

Jumps production 8 to 40 pieces per day with *Buck* 15" Aluminum power chuck

The round valve body was hard to hold on a turret lathe with a 4-jaw chuck—and truing each piece took too much time and labor. Production was 1 piece per hour, only 8 a day.

Then a Buck 15" 2-jaw aluminum power chuck was called on for Operation No. 1: face, turn, bore, counterbore, chamfer, and tap. The result—"Production is now 40 pieces per day . . . further savings would show if figures had been kept on breakdown time and chuck repairs formerly needed."

Concentricity is held to within .002"—accuracy that's possible due to the unique Buck Ajust-Tru® principle.

You can't raise production 500% every time—but you can make money every time you chuck with Buck. Send for a catalog—see why.

Makers of Scroll, Power, Dust Proof, Independent Chucks.

BUCK TOOL COMPANY

1018 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 102

New Four-Way Air Valves are covered in a bulletin which contains an alternate bases and integrated speed control section for Series CC valves. Bulletin 235 available from Hannifin Co., or Circle No. C28.

Cold Finished Steel Bar, Jalcase 100—its physical properties, analysis, and machinability rating—is presented in a booklet from Jones & Laughlin Steel Corp., or Circle Inform-A-Gram No. C29.

Resistance Welding Case Histories are given in a bulletin that discusses production advantages and product improvements. Write to Sciaky Bros., Inc. for your copy of "Resistance Welding at Work., Vol. 5, No. 5, or Circle No. C30.

Cold Extruded Metal Parts are highlighted in a new bulletin that describes the process for producing these parts, their physical characteristics, mechanical properties, and applications. Burgess-Norton Mfg. Co., publishes the bulletin, or Circle Inform-A-Gram No. C31.

"Epocast Laminating Resin" is a bulletin which outlines major uses of these resins and contains a table of their properties. Get copy from Furane Plastics Inc., or Circle Inform-A-Gram No. C32.

Packaged Centralized Lubrication Systems for bearings and gears are discussed in a bulletin which shows how these units work. A handy table helps in the selection of the correct system. Bulletin 659 supplied by Trabon Engineering Corp., or Circle Inform-A-Gram No. C33.

Balance Grinding Wheels quickly and accurately with the simple portable equipment discussed in a bulletin from Aero Supply Mfg. Co., Inc. To get Bulletin 2260, Circle Inform-A-Gram No. C34.

Catalogs . . .

"Preparing Aluminum for Anodizing" contains data on applications of Clepo compounds and methods for cleaning oil, scale, buffing compound, etc., from aluminum surfaces. The Frederick Gumm Chemical Co., Inc., supplies copies, or Circle No. C35.

"Pressure Nitriding Process" discusses the new method for producing an extremely hard case on nitrided steel parts to make them resistant to spalling and softening at high temperatures. Get copy from the A. F. Holden Co., or Circle Inform-A-Gram No. C36.

Heat Treating Units and related equipment are presented in "The Facts on the New Ipsen Heat Treating Units." It gives specifications and applications for various models. Get your copy from Ipsen Industries, Inc., or Circle No. C37.

Precision Boring, Facing and Internal Threading Tools are listed in a new brochure that gives 17 sizes for holes from 1/16" dia. Get your 1959 edition from Comet Tool Co., or Circle Inform-A-Gram No. C38.

A New Thread Rolling and Forming Machine is announced in a bulletin which details design features and lists specifications. Get Bulletin E-101 from Landis Machine Co., or Circle Inform-A-Gram No. C39.

Sintered Metal Parts are discussed in a bulletin which explains the process of producing the parts and gives physical characteristics, mechanical properties, economies, and applications. Get a copy from Burgess-Norton Mfg. Co., or Circle Inform-A-Gram No. C40.

New Air Control Valve bulletins describe a line of hand-, foot-, air-, and solenoid-actuated air control valves. Specifications are given for these valves used for pneumatic or hydraulic service. Bulletin 8100 is available from Cleveland Pneumatic Industries, Inc., or Circle No. C41.

"Pneu-Hydra Installation Tools" describes two models of these pneumatic-hydraulic tools for fastening operations. Dimensions, fastener types that can be handled, and performance curves are included. Bulletin 8-475 published by Huck Mfg. Co., or Circle No. C42.

Rectangular and Square Bars are listed in a table by pounds per foot in a bulletin which also gives complete sizes and alloy specifications for brass, bronze, and nickel-silver bars. Get a copy from Titan Metal Mfg. Co., or Circle No. C43.

Pusher Type Furnaces with ceramic heating elements are described in a new bulletin. Models for temperatures up to 2600°F are explained and dimensions given. Bulletin 5902 supplied by C. I. Hayes, Inc., or Circle Inform-A-Gram No. C44.

Inline Accessories are discussed in a bulletin which gives dimensions for pressure regulators, strainers, flow control valves, and sequence valves. Write Airmatic Valve, Inc. for your copy of Bulletin 91021, or Circle No. C45.

"Compressed Air Fundamentals," a 15-page booklet, is a handy guide to the selection of small packaged air compressors and includes specifications of various units. Get a copy from Ingersoll-Rand Co., or Circle Inform-A-Gram No. C46.

5603

NOW!

NEW *Convenience*
NEW *Capacities*
NEW *Designs*

PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

NEW provision for increasing table area!

NEW provision for raising and lowering overhanging loads!

NEW convenience in maneuvering! Six wheel models roll easier . . . turn shorter.

NEW overhanging conveyor tops!

More stamina, more versatile performance than ever before

NEW FREE LITERATURE illustrates and describes all! Write for Bulletin P-5603. Address, The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio.

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 103

This Jones & Lamson Optical Comparator...Pa

At Ace Electronics Associates, Inc. an alert management cut costs, increased production and improved product quality through speedy, precise inspection methods.

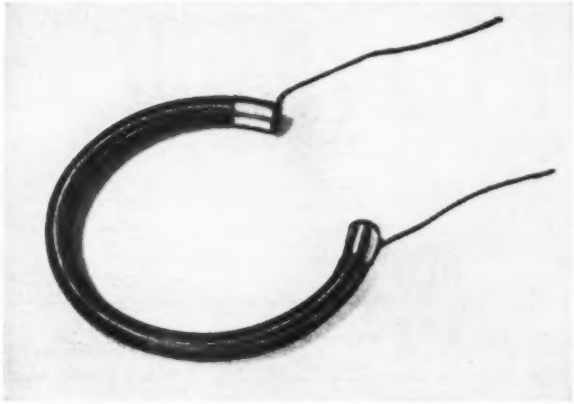
At Ace Electronics Associates, Inc., Somerville, Mass., precision of manufacture is of paramount importance. This young, progressive company, manufacturer of linear and non-linear potentiometers and electromechanical devices, including Acepot and Acetrim, insists that each and every product made in its plant give 100% reliability in the field. The aim is to not only meet, but to surpass its customers' most exacting specifications. This is being done on every piece, every day.

Through stringent quality control procedures tailored to meet unique tolerance problems, manufacturing methods have been constantly improved, costs have been cut to the bone, production has reached new high levels, and product reliability is superb.

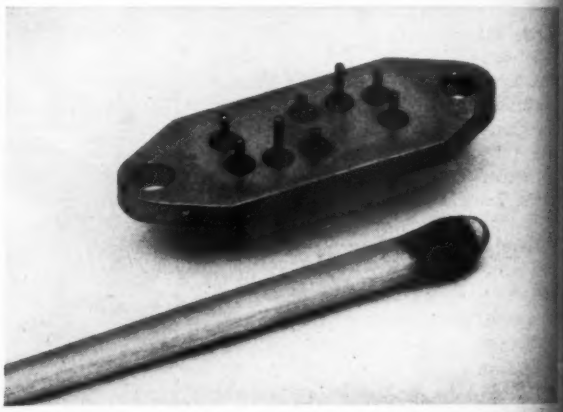
Ace gives much of the credit for this record to the Jones & Lamson Optical Comparator, which is their most important measuring and inspecting tool.

Shown here are a few of the ways in which David St. John, Ace's Chief Inspector, uses the J & L PC-14 Optical Comparator.

These actual case histories, solid proof of the J & L Comparator's speed, precision, versatility and dependability, may suggest ways in which *you* can use a J & L in *your* operations. Write today for Catalog LO 5700, which gives detailed information.



The wound element of the Acepot potentiometer is inspected for conformity to a specific curve giving an electrical quantity at a specific angle. The Comparator also inspects the winding for proper spacing, and its condition at contact point. Inspection is 4 times more precise and 2 times faster than alternate inspection method.



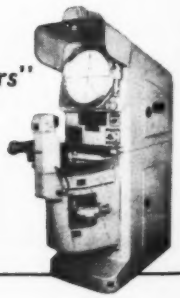
This relay component is inspected to verify the locations of pins to true position within .005″ and perpendicularity within .001″. With the J & L Comparator, even though pins are of different heights, they can be inspected in the same set-up, by varying the focal point. The part is rotated 180° only once. This inspection method replaces a lengthy and difficult mechanical method.

"World's oldest and largest builder of precision optical comparators"

J&L JONES & LAMSON

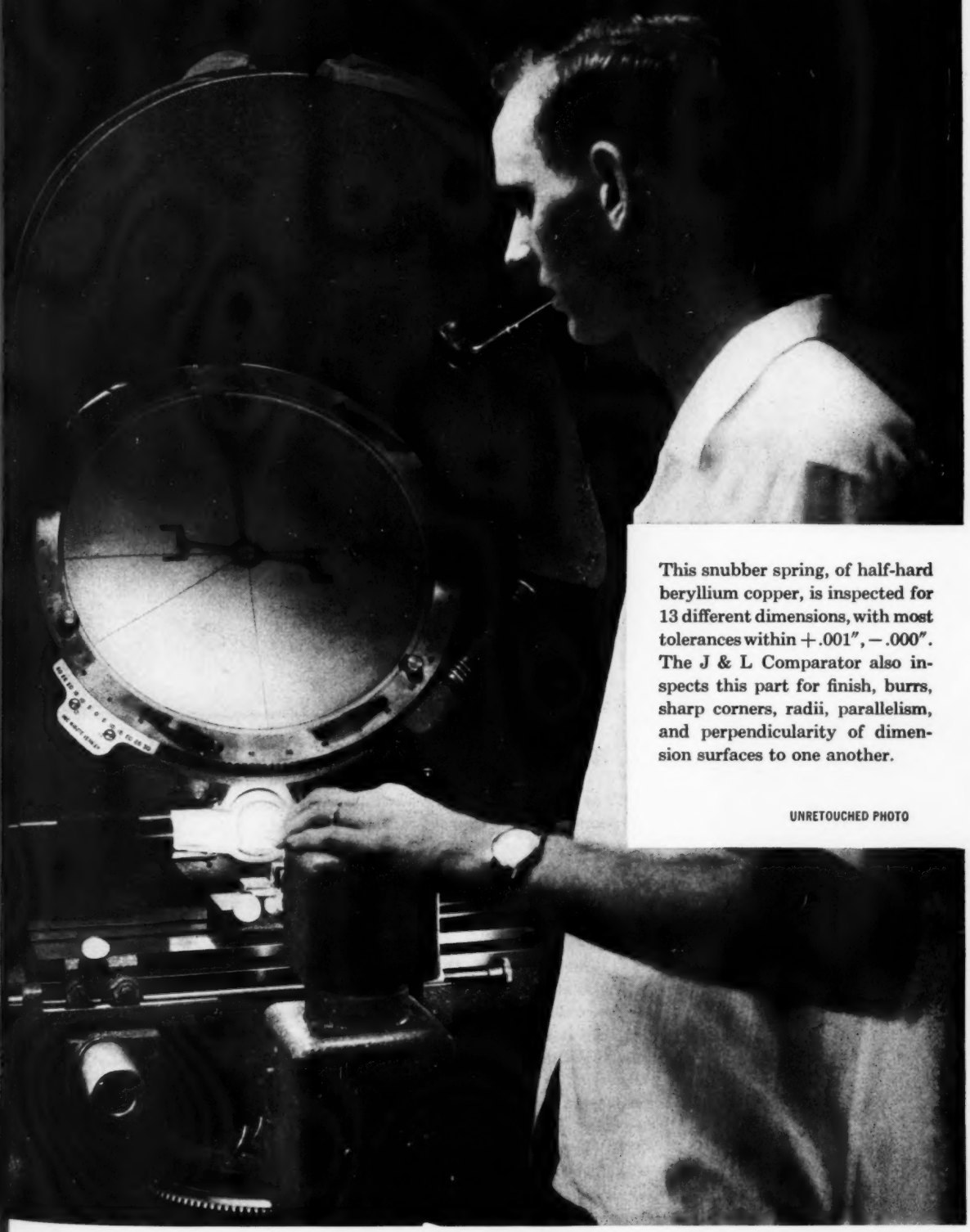
JONES & LAMSON MACHINE COMPANY

519 Clinton Street, Springfield, Vermont



FC-14

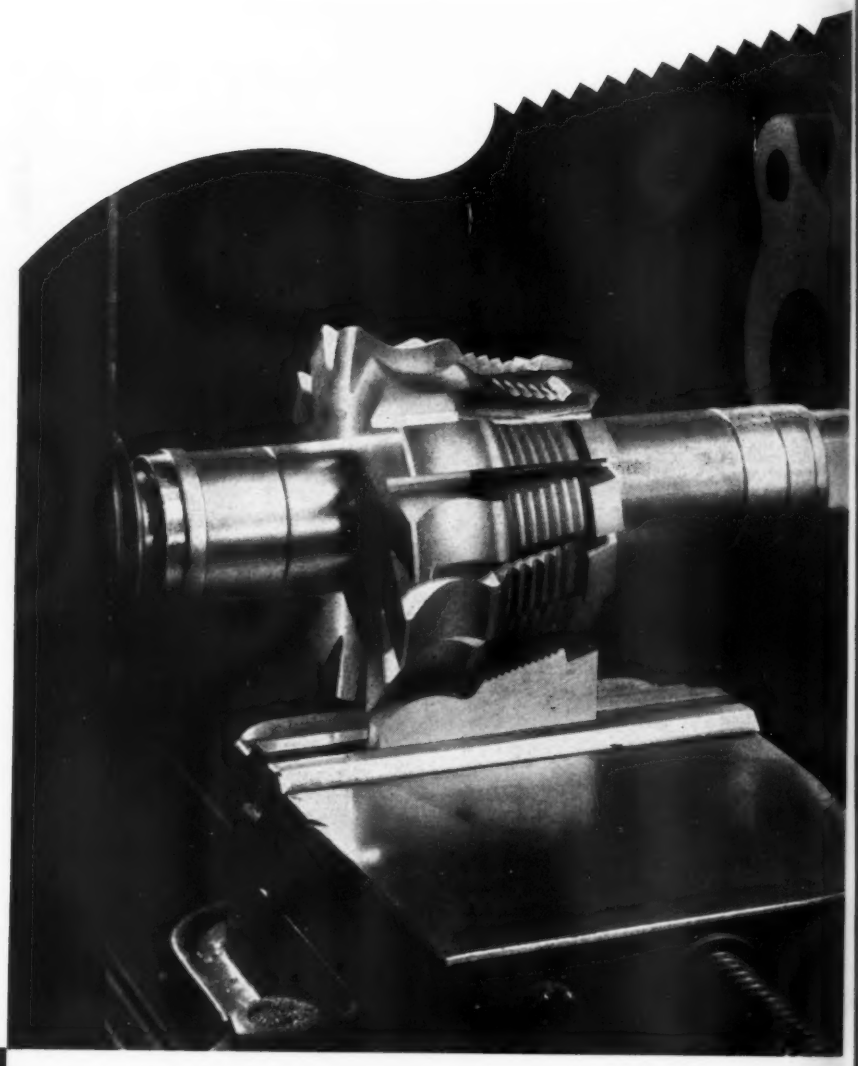
..Paid for itself in Less than a Week!



This snubber spring, of half-hard beryllium copper, is inspected for 13 different dimensions, with most tolerances within +.001", −.000". The J & L Comparator also inspects this part for finish, burrs, sharp corners, radii, parallelism, and perpendicularity of dimension surfaces to one another.

UNRETOUCHED PHOTO

CIRCLE INFORM-A-GRAM KEY NO. 105



Cutters with built-in Efficiency and Accuracy

This is an example of how efficiency and accuracy can be designed right into the cutting tool. The manufacturing and engineering capabilities of Barber-Colman Company can be added to your own in finding better solutions to milling problems.

The form shown at the left of the part is milled at the same time the multiple serrations are cut. Milling sharp points on the serrations is made possible by the alternate tooth design (see photo, above). The cutter is shown milling a sample which is later projected against an enlarged layout of the part to assure that the cutter will produce within specified tolerances. But, some of the most important quality features of this cutter are not visible to the naked eye.

Unground form . . .

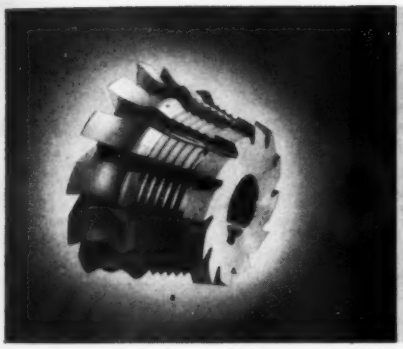
Ability to combine complex tool geometry and accuracy in this cutter without form grinding reduces original cost. In addition to greater accuracy, you get longer tool life from a cutter that is metallurgically as well as geometrically well formed. Barber-Colman's individual processing in the most modern metallurgical lab and heat-treating department assures highest quality which can be tested by the number of high-quality parts manufactured for every dollar of cost.

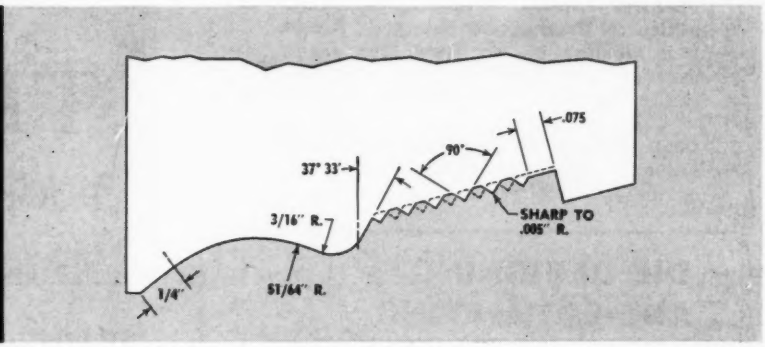
Sharpening economies . . .

Additional savings result from Barber-Colman's exclusive design and manufacturing techniques. For example,

Mill Odd Shapes in One Operation

...with Barber-Colman Form-Relieved Cutters





the smooth finish on the tops and sides of the teeth eliminates rough edges — a common cause of breakdown on the flanks. Faces are index-sharpened, permitting the important economy of *automatic resharpening.* Your sharpening guide or an automatic sharpener will maintain original accuracy throughout the life of the cutter.

These economies reduce the most important elements of tool cost: the cost of scrap and rework, cost of sharpening, cost of downtime for tool changes, and cost of tool depreciation.

Five types of engineering...

You get more than a cutting tool when you buy "Barber-Colman." You get five types of specialized engineering that reduce your costs and upgrade your quality:

1. *Application engineering* — on-the-spot evaluation of milling problems by experienced tool designers.
2. *Design engineering* — highly specialized tool engineering, backed by electronic computer facilities for fast, accurate calculation of complex forms.
3. *Metallurgical engineering* — specially selected steels and heat treatment for your particular material and tool geometry.
4. *Manufacturing* — the most complete and advanced processes under one roof for producing exactly the right finish, highest accuracy, and *any* cutter style.
5. *Quality control* — optical master inspection, seven different control stations, and numerous separate inspections for individual cutters.

Whether you want to combine operations, change processes, or just get more out of your tooling dollar, you can have a Barber-Colman field engineer at your desk for consultation by just calling Rockford — TR 7-5741.

Barber-Colman Company

BARBER COLMAN

107 Loomis Street, Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 107

10-DAY TRIAL OFFER!

10-day examination allowed; returnable for full credit or refund if returned in saleable condition.

HUEBNER PUBLICATIONS, INC.
1975 LEE ROAD, DEPT. E
CLEVELAND 18, OHIO

Gentlemen: Please send books checked.

☐ **ADHESIVE BONDING OF METALS** by George Epstein. 1954; 227 pages. Types and strengths of adhesives, joint factors, etc. **$2.95**

☐ **BRAZING MANUAL** prepared by the Committee on Brazing and Soldering, American Welding Society. 1955; 208 pages. Practical information on every type of brazing problem, including tables. **$4.75**

☐ **COLD FORMING OF STAINLESS STEELS** by Lester F. Spencer. A 28-page pamphlet on the subject. **$1.00**

☐ **DIE DESIGNING AND ESTIMATING**

Fourth Edition

368 pages, 26 chapters, over 400 illustrations, charts and graphs. 165 Practical Points in Die Design and Construction. Comprehensively indexed.

Written for Die Designers, Die Engineers, Tool and Die Makers, Owners and Managers of Tool and Die Shops and Depts., Students, Apprentices and valuable, too, as a reference and refresher for the die experts who are more than qualified to write a comparable text. **$7.50**

☐ **DIAMOND TECHNOLOGY** by Paul Grodzinski. 784 pages. 93 working tables, and over 486 photographs and drawings. The only standard work on the subject. **$10.00**

☐ **DIE ESTIMATING** fourth edition. Provides the KNOW-HOW for determining what it takes in units of time to build a die. 62 pages. **$3.00**

☐ **ELECTROPLATING ENGINEERING HANDBOOK** edited by A. Kenneth Graham. 1955; 670 pages. Complete engineering fundamentals and processing data on all phases of electroplating. **$10.00**

☐ **ENGINEERING USES OF RUBBER** edited by McPherson and Klemin. 1956; 528 pages. Written especially for engineers employing rubber in processing operations and in manufactured products. **$12.50**

☐ **INDUSTRY AGREES ON 'BUILDING BLOCK' STANDARDS** by William E. Hoffman. **$1.00**

TECHNICAL BOOKS BOOKS BOOKS BOOKS

☐ **FASTENERS HANDBOOK** by Julius Soled. 1957; 450 pages. Complete data, illustrations and descriptions covering all currently available industrial fasteners. **$12.50**

☐ **GEARS FOR SMALL MECHANISMS** by W. O. Davis. 20 chapters profusely illustrated covering theory, design and practice in cutting and generating gear tooth forms. **$5.00**

☐ **HANDBOOK OF LAYOUT AND DIMENSIONING FOR PRODUCTION**

by Hyman H. Katz

The functional principles of dimensioning in clear, interesting and succint English.

479 PAGES **$15.00**

☐ **HANDBOOK OF BARREL FINISHING** by Ralph F. Enyedy. 1955; 288 pages. Every phase of barrel finishing, including over 150 complete specification sheets and latest development. **$8.25**

☐ **INDUCTION & DIELECTRIC HEATING** by J. Wesley Cable. 1954; 590 pages. Up-to-date treatment on high frequency heating. **$13.50**

☐ **INSTRUMENTS FOR MEASUREMENT & CONTROL** by Werner G. Holzbock. 1955; 416 pages. Fully describes, illustrates and compares all current devices for measuring and controlling temperature, moisture, pressure, flow, uniformity, etc. **$10.00**

☐

MATHEMATICAL PROGRAMMING

by Reinfeld & Vogel. 274 pages. The practical application and use (rather than theory) of mathematics in industrial programming. **$8.00**

REFERENCE

OKS BOOKS BOOKS BOOKS

☐ **MACHINING, HEAT TREATMENT & PICKLING OF STAINLESS** by Lester F. Spencer. 36 pages on the working of stainless steel. **$1.50**

☐ **MICROSTRUCTURES OF DIAMOND SURFACES** by S. Tolansky. 11 chapters of original research. New optical techniques explained. **$8.50**

☐ **PLASTICS ENGINEERING HANDBOOK**, compiled by The Society of the Plastics Industry. 850 pages. **$15.00**

☐ **PRINCIPLES & METHODS OF SHEET METAL FABRICATING** by George Sachs. 1951; 537 pages. Describes in detail sheet metal forming methods, metallurgical effects in stamping, drawing, extruding, bending; design of parts and dies, etc. **$11.00**

☐ **PROTECTIVE COATINGS FOR METALS** by Burns and Bradley. 2nd edition. 1955; 657 pages. Latest information on the composition, properties and performance of metallic and organic coatings. **$12.50**

☐

A DICTIONARY OF METALLURGY

by A. D. Merriman

G.C., O.B.E., M.A., D.Sc., C.I. Mech. E., F.R.S.E.

400 PAGES
Profusely Illustrated

Just published February 16, 1959. Prepared by Dr. Merriman, Secretary of the Institution of Metallurgy, Great Britain, this is the most comprehensive work of its kind ever to appear in print. The Dictionary of Metallurgy provides:

- 7,000 definitions
- 283 illustrations
- 236 tables—including those constants invaluable for reference purposes
- An appendix which includes a Table of Common Abbreviations and Symbols, a Table of Abbreviations Used in Foreign Literature, and a Table of Physical Properties of Metals.

$25.00

☐

TECHNIQUES OF PRESS-WORKING METAL

by Eary & Reed, 472 pages. 20 chapters and hundreds of drawings cover this subject in highly comprehensive detail. **$12.00**

☐ **THE PRINCIPLES OF INVENTORY MANAGEMENT** by Nyles V. Reinfeld. An authoritative 32-page treatise on the economic aspects of analysis within your existent inventory control system. **$2.00**

☐ **TREATISE ON MILLING & MILLING MACHINES** by The Cincinnati Milling Machine Co. 896 pages, over 200 formulas and 700 illustrations and charts. **$8.00**

☐ **THE ACCURACY & GEOMETRY OF PRECISION SURFACE PLATES, ANGLES & STRAIGHT EDGES** by E. Willard Pennington. **$ .75**

AMOUNT OF ORDER $_____

Open account shipments to rated companies. Otherwise payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax. Quantity prices quoted on request.

COMPANY _____

CITY _____ ZONE _____ STATE _____

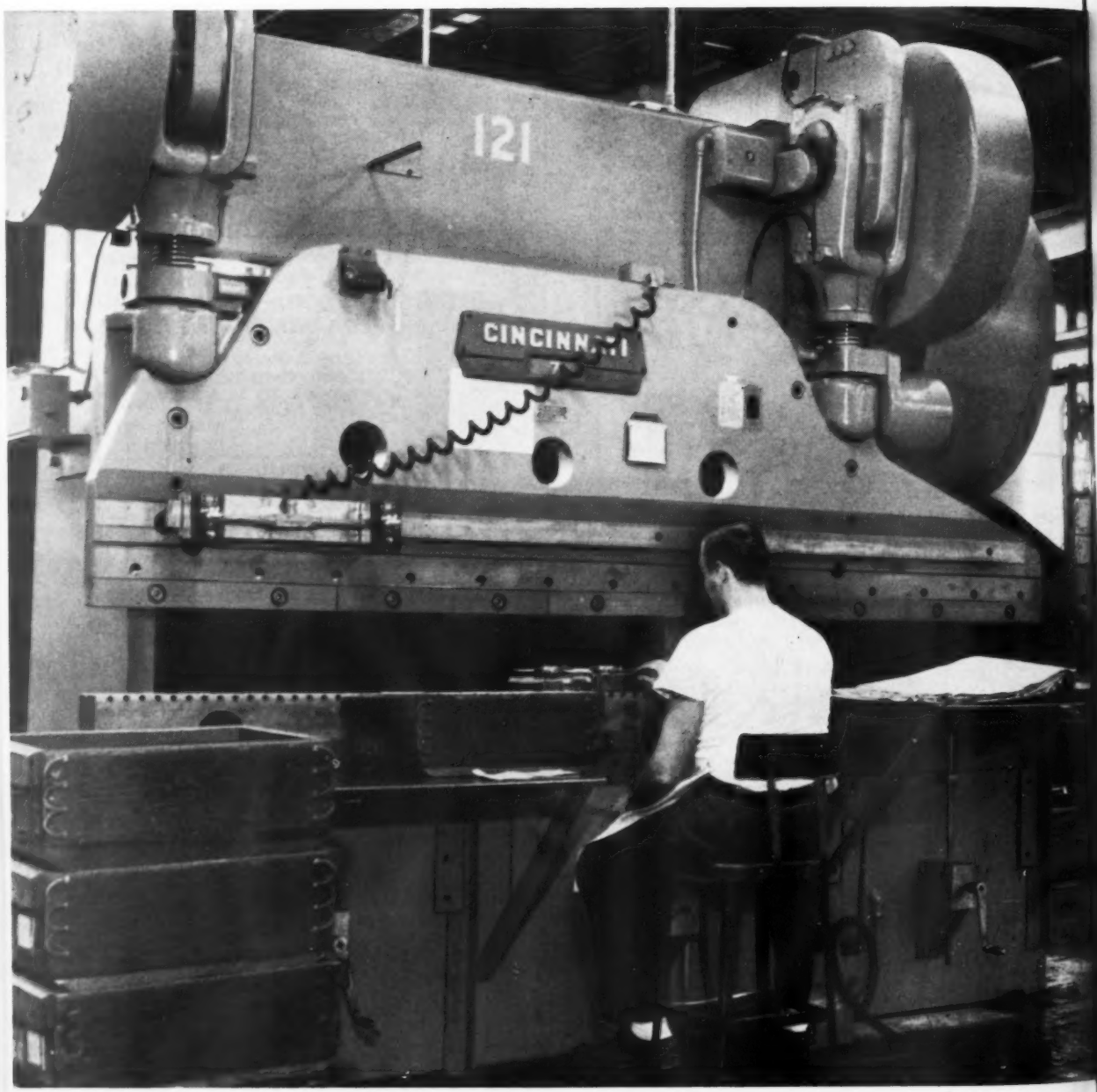
ADDRESS _____

BY _____ TITLE _____

Cincinnati® automatic cycle sav sto

Cincinnati Automatic Cycle Press Brake combines instantaneous fast and slow ram speeds with every stroke. This permits fast forming of long, flexible parts without "whip up" and "back bends." Also eliminates the need for an operator skilled at clutch slipping. "NCR" uses it to form parts for electronic business machines and computers.

Courtesy The National Cash Register Company



lesaves $6900 on dies; stops "back bends"

The National Cash Register Company, Dayton, Ohio, has earned a healthy pay-off with this Cincinnati Automatic Cycle Press Brake. They have shrunk production costs in two ways:

1 On one part for a new electronic bank machine, they use simple press brake dies (costing about $600) instead of conventional punch press dies (costing about $7500). Similar savings are multiplied on 300 other parts formed on this machine.

2 They have eliminated "back bends" which damage large cabinet panels. This is a result of the Cincinnati Automatic Cycle—a feature you can't buy on any other press brake.

You can earn comparable savings in your shop with a Cincinnati Automatic Cycle Press Brake. Ask us to show you how.

Shapers / Shears / Press Brakes

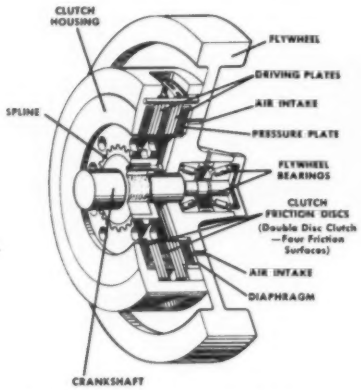
THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 111

Product News

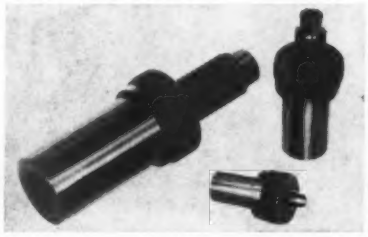
Self-Adjusting Air Clutch



Operating on controlled air pressure, this new disc-type low-inertia air clutch, featured on Federal OBI presses, uniformly engages a full 360° of friction surface. It delivers full torque at all times and assures high-speed, shock-free action, and less noise with low air consumption. Literature available from The Federal Press Co., Elkhart, Ind., or Circle No. P1.

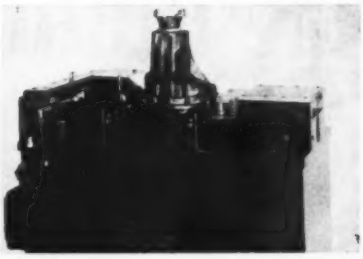
Jig & Fixture Jacks

Adjustable weight clamping for pressure stops is possible with the new jig and fixture jacks that adjust to irregularities of all milling operations. Pin construction permits jack to elevate vertically without rotation. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, or Circle Inform-A-Gram No. P2.



Horizontal Marking Machine

A wide range of round parts can be individually adapted to mass production marking when this versatile marking machine and GTS fixture are used together. Model 465 is equipped with a roller conveyor fixture to mark gear carriers. It's conveyor fed and discharged, and the entire marking cycle is completely automatic Geo. T. Schmidt Inc., 4112 N. Ravenswood Ave., Chicago 13, or Circle Inform-A-Gram No. P3.



Cold Heading Tool Steel

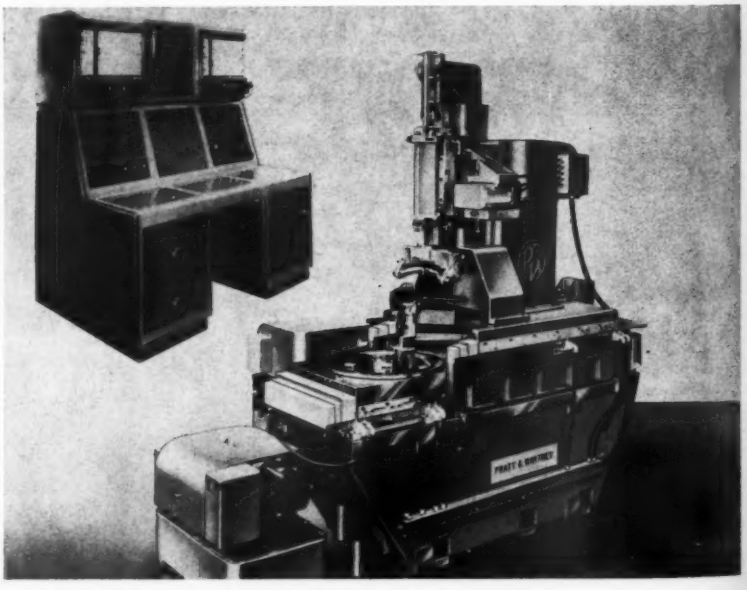
High-speed long-run production of nuts, bolts, rivets, and other cold headed parts is facilitated with a new special carbon tool steel. Because of long wearing qualities, the steel is good for many types of dies and wherever material flow and resistance to washout are major factors in die performance. Latrobe Steel Co., Latrobe, Pa., or Circle P4.

Universal Toolholder

This new universal toolholder is for lathes with 16″ swing or larger. Great rigidity and accuracy are obtained by locking the toolholders against the body of the toolpost. Literature available on the Malcus toolholder from Homestrand, Inc., 9 Addison St., Larchmont, N.Y., or Circle Inform-A-Gram No. P5.

New Tape-Controlled Gaging System

A new numerically controlled gaging machine quickly checks almost any shaped component, at even hundreds of coordinate reference points of their inner or outer surfaces. Data-Limit 6 coordinate measuring machine uses perforated tape to eliminate templates and other special gage tooling. Thus, part-to-part changeover is fast, simple, and economical, and engineering changes can be added without causing inspection delays. Bulletin 627 is available from Pratt & Whitney, Co., Inc., W. Hartford 1, Conn., or Circle Inform-A-Gram No. P6.



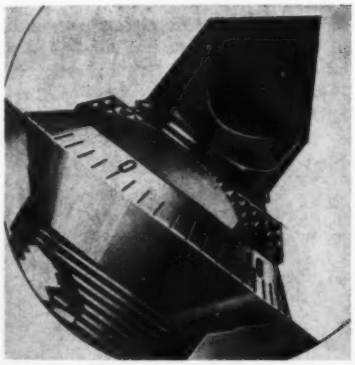
Product News

New Unitized Tooling

For perforating various materials up to ½" mild steel or its equivalent in tensile strength, Tool Products has developed this new standardized heavy-duty unitized tooling

line. It features alloy steel holders, built-in lubrication, easily removable punch and die (while unit is mounted in the setup), and interchangeability of expendable parts because dimensions conform to industry standards. Tool Products Corp., 377 Old Falls Blvd., N. Tonawanda, N.Y., or Circle Inform-A-Gram No. P7.

Titanium Carbide Tipped Tools

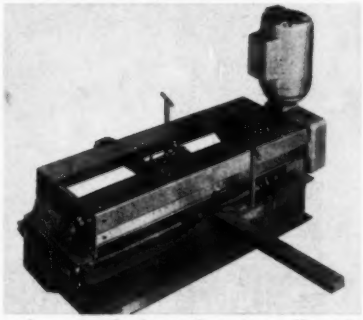


Fast feeds and speeds are made possible with these titanium carbide and ceramic tipped Microbore tools, which produce excellent surface finish. There's a minimum of overhang between cutting tip and cone seat assembly for greater rigidity. DeVlieg Microbore Div'n, DeVlieg Machine Co., Fair St., Royal Oak, Mich., or Circle No. P8.

Press Calculator

Quickly and easily select correct size of mechanical or hydraulic press with a press calculator described in a bulletin. Calculator gives crankshaft diameter, tonnage required at the bottom of the stroke for blanking jigs, and correct press speed. Write for a bulletin on it. The Calculator Co., P. O. Box 4236, Philadelphia 44, or Circle Inform-A-Gram No. P87.

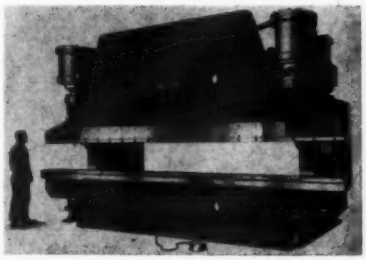
Power Slitting Shear



A rugged deep-throat easily-adjusted back gage is featured on this new power slitting shear. Made to handle 10-, 14-, and 20-ga mild steel, the new shear has two reversible and interchangeable chrome cutters. Beverly Shear Mfg. Co., 3004 W. 111th St., Chicago, or Circle No. P9.

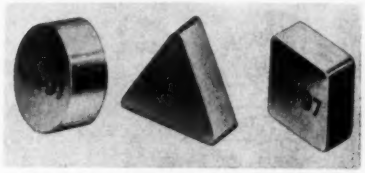
Large Press Brake

A Long Hydraulic Press Brake handles up to 20′ x 5/16" mild steel plate and features flexibility of operation. Ram travel may be adjusted quickly to suit operation and saves production time because it doesn't have to travel through any standard

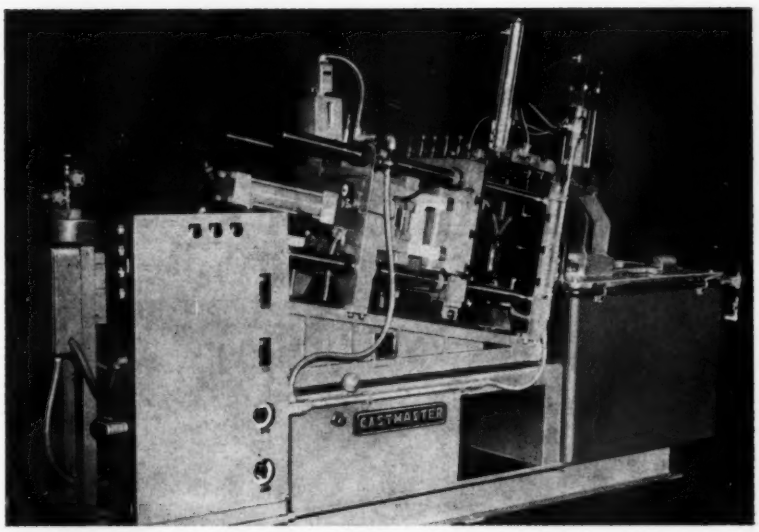


cycle pattern. The Cleveland Crane & Engineering Co., Wickliffe, Ohio, or Circle Inform-A-Gram No. P10.

Round Inserts



Round ceramic VR-97 throw-away inserts are now available for use in many machining applications from fine finishing to machining hardened steel and cast iron. Extreme resistance to heat, edge wear, and cratering permit speeds up to 2000 sfm, up to ⅜" depth of cut, and feeds from 0.005" to 0.020". Vascoloy-Ramet Corp., Waukegan, Ill., or Circle No. P11.



New High-Speed 100-Ton Die Casting Machine

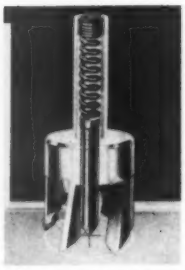
This new automatic hot chamber die casting machine is designed for extremely fast production — up to 1000 shots/hr — of small zinc die castings. Model 7Z features inclined platens and injection cylinder to keep nozzle drippings to a minimum and to permit castings to fall freely. It has 21½ x 21½" die mounting plates, 8" maximum die stroke, and 6½" injector cylinder stroke. CastMaster, H-P-M Div'n, Koehring Co., 23901 Aurora Rd., Bedford, Ohio, or Circle No. P12.

Product News

Tapping Attachment

Continuous Operation at speeds up to 2500 rpm are possible with the Tapmatic 300A tapping attachment. Features axial floating drive spindle and supersensitive spring-loaded ball clutch. Rated capacity for tapping mild steel is from #00 to #10-24. Tapmatic Corp., 845 W. 16th St., Costa Mesa, Calif., or Circle No. P13.

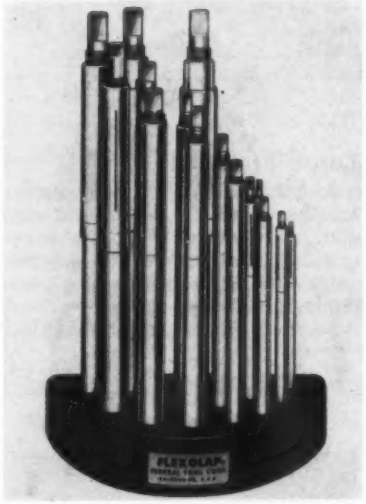
Heavy-Duty Bore



This new Roto-Bor produces burr-free holes in thick sheet and plate and works efficiently to produce accurate holes in cylindrical and spherical forms, including both tubing and pipe. Sizes range from $\frac{3}{16}$" to $2\frac{1}{32}$" in increments of $\frac{1}{64}$". Jancy Engineering Co., 508 S. Pine St., Davenport, Iowa, or Circle No. P14.

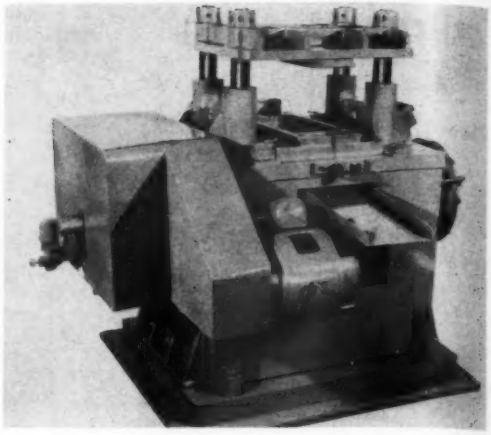
Quick Lapping Time

Lap rounder, straighter holes in less time with Flexolaps. They're quickly and easily adjustable for fast lapping and polishing without danger of galling or seizing. Sizes are listed in a bulletin available from Federal Tool Corp., 3600 W. Pratt Blvd., Chicago 45, or Circle No. P15.



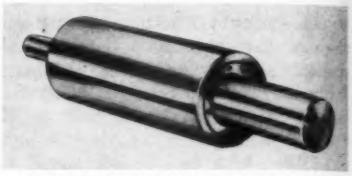
Cuts Coil Stock

This heavy duty flying-die-type cut-off and pre-notch press handles coils of rolled formed materials for greater economy. Model 5-D is available with 300 rpm operating speed and in 4- to 120-ton capacities. Dahlstrom Machine Works, Inc., 4227 W. Belmont Ave., Chicago 41, or Circle Inform-A-Gram No. P16.

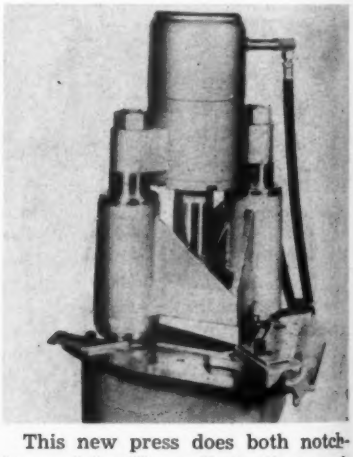


Cartridge-Type Spindle

You can build up special machines faster and at lower cost with these cartridge-type precision spindle assemblies. They're available in 28 standard models, and offer a range of four basic sizes and two methods of mounting the spindle to the machine. Russell T. Gilman, Inc., 623 Beech St., Grafton, Wis., or Circle No. P17.



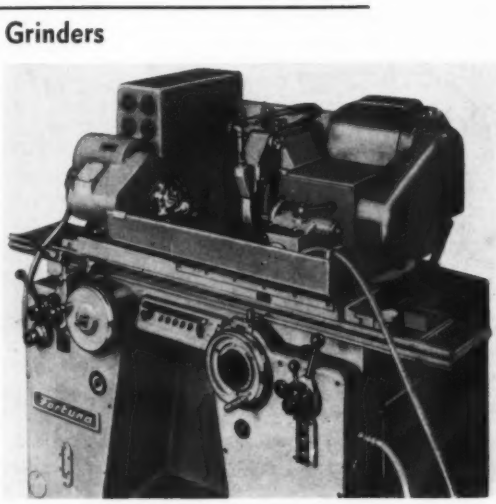
Notches and Bends



This new press does both notching and bending, eliminating work handling and need for second operation presses. Model 610 comes with a 1½-hp motor for operation at 7 spm, or 3-hp motor for 12 spm that notches or bends angle iron or flat sheet stock. W. A. Whitney Mfg. Co., 636 Race St., Rockford, Ill., or Circle No. P19.

Precision Cylindrical Grinders

New Fortuna AFB Series cylindrical grinding machines come in 16 types, from manually fed to automatic cycle control models. They're used for traverse and plunge-cut grinding and easily adapted to internal grinding of single- or mass-produced work. Hydraulic table traverse has infinite speed variation between 2" and 26' per min. Control of rough and finish grinding is done by an automatic sizing device which controls in-feed of work table by measuring effects of wheel wear. Cosa Corp., 405 Lexington Ave., New York, or Circle No. P18.



DON'T WASTE DOLLARS

IN MACHINE OUTPUT

TO SAVE PENNIES

IN TOOL LIFE

HERE'S HOW SOME SHOPS HAVE DOUBLED AND TRIPLED THE OUTPUT OF EXPENSIVE MACHINES

Typical Examples—Same Machines . . . Same Tools . . . Same Workpieces								
	Job No. 1		Job No. 2		Job No. 3		Job No. 4	
	240-Minute Tool Life Setup	25-Minute Tool Life Setup	75-Minute Tool Life Setup	25-Minute Tool Life Setup	120-Minute Tool Life Setup	80-Minute Tool Life Setup	120-Minute Tool Life Setup	22-Minute Tool Life Setup
Machine Cost per Hour	$ 8.00	$ 8.00	$10.00	$10.00	$ 9.00	$ 9.00	$ 9.00	$ 9.00
Tool Cost per Hour	$ .04	$ .40	$ .36	$ .76	$ .14	$ .215	$ .14	$ .77
Cost per 8-Hour Shift	$64.32	$67.20	$82.88	$86.08	$73.12	$73.72	$73.12	$78.16
Pieces per Shift	51	181	8	17	94 hrs./pc.	41 hrs./pc.	8	16
Cost per Piece	$ 1.26	$ .37	$10.36	$ 5.06	$859.16	$377.81	$ 9.14	$ 4.88
Cost Reduction	70%		51%		56%		47%	

Get the complete story . . . send for the booklet "There's Profit in Retiring a Tradition."

From many machine shops the story is the same—*they are sacrificing low-cost carbide inserts through increased feeds and speeds . . . to achieve startling savings in total-cost-per-piece.* Production increases even greater than 100% have been recorded. The increased tool costs were insignificant by comparison.

Where machines have been operating at less than maximum efficiency, *unit cost can be reduced on many jobs overnight* . . . merely by using modern cutting tools to get full potential machine output . . . instead of operating at fractional machine capacity to gain long tool life.

This idea has been *PROVEN-IN-USE* by many progressive plants. We will gladly send you records of such operations. These results can be duplicated in plants where machines and talented operators have been held back by old ideas about tooling and tooling costs. Ask your Kennametal Carbide Engineer how Kendex* (patented) tooling can help you get more efficient output from your machines . . . or write KENNAMETAL INC., Latrobe, Pennsylvania, for the booklet "There's Profit in Retiring a Tradition."

*Trademark

9-7229

INDUSTRY AND

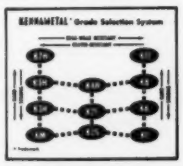
KENNAMETAL

. . . Partners in Progress

TO MULTIPLY YOUR MACHINE OUTPUT ...YOU NEED 3 THINGS:

The 'Three-Man Tooling Team' that utilizes the specialized knowledge of your Tool Engineer, your Machine Operator, and the Kennametal Carbide Engineer . . . *to get the right tooling on every job.*

The Kennametal complete range of grades that provides the precise properties and uniformity that permits *accurate prediction of tool life.*

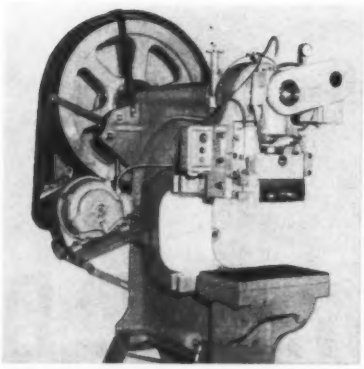


Kendex Instant insert change without need to reposition the tool. This is the key to this new practice . . . *frequent tool change without excessive down-time.*

CIRCLE INFORM-A-GRAM KEY NO. 115

Product News

Deep Throat Press



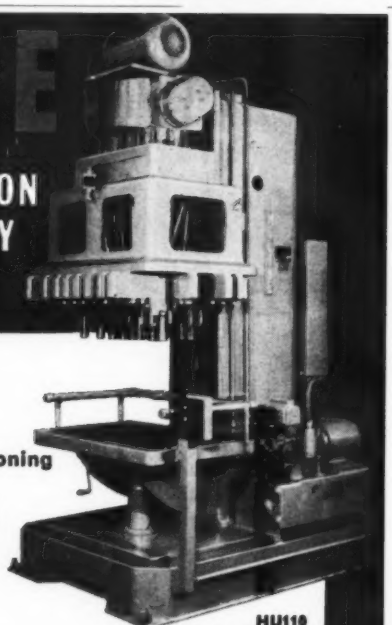
A 30-ton capacity press with 24" throat depth is equipped with air cylinder tripping for easy operation. The machine is built with a new pitman and ram construction which has a cross bar knockout. Get information from Perkins Machine Co., Warren, Mass., or Circle Inform-A-Gram No. P20.

MOLINE

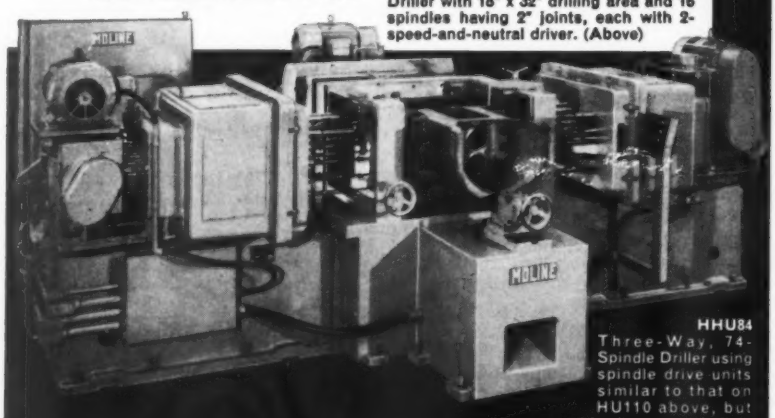
FOR GREATER PRODUCTION EFFICIENCY SAVINGS

Use rugged, reliable "Hole Hog" machine tools for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools



HU110
Universal Joint Type Driller with 18" x 32" drilling area and 16 spindles having 2" joints, each with 2-speed-and-neutral driver. (Above)



HHU84
Three-Way, 74-Spindle Driller using spindle drive units similar to that on HU110 above, but with slip-type spindles.

★ Over 58 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

MOLINE TOOL COMPANY
100 20TH STREET, MOLINE, ILLINOIS
REPRESENTATIVES IN PRINCIPAL CITIES

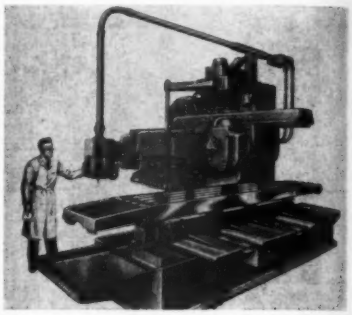
CIRCLE INFORM-A-GRAM KEY NO. 116

Special Cartridge

This is a special cam-lock cartridge for use in Clark floating finishing bars and other tools. It locates one or more cutters anywhere along the bar without gun drilling a long hole. With the cartridge, cutters are exactly centered. Data available from Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif., or Circle No. P21.

Mills Super Alloys

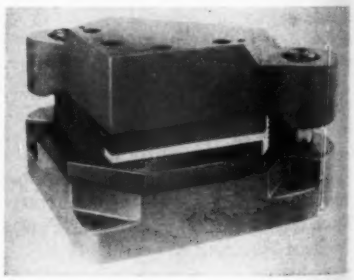
A New Milling Machine, the 746 Versi-Matic, is adaptable to either punched or magnetic numerical control systems and meets or exceeds



A.I.A. specifications for medium-sized milling machines. Cuts or shapes tough super alloys while maintaining exacting tolerances. Van Norman Machine Co., Springfield 7, Mass., supplies a circular, or Circle Inform-A-Gram No. P22.

Notching Units

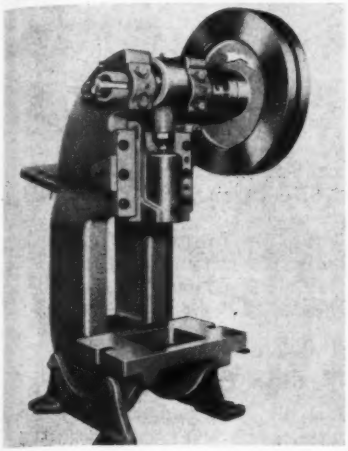
This new notching unit series for quick mounting to punch presses or press brakes is self-contained with



permanently aligned punch and die. They're combination 90° corner or 90° Vee notching dies for notching flat stock or angle iron close to the inside leg. Toolset, Inc., 1411 Military Rd., Buffalo 17, N. Y., or Circle Inform-A-Gram No. P23.

Product News

Standard Economy Press



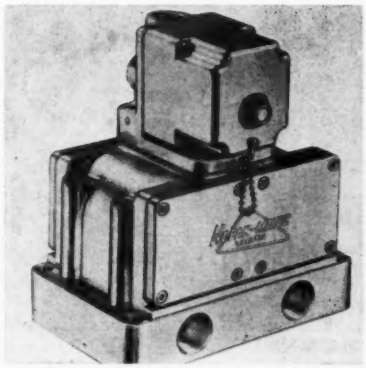
A new Series 40 press develops five full tons, yet has been designed to meet economy requirements. Standard stroke is 1" with 7½" shut height, but 1¼", 1½", and 2" strokes are also available. For details, write Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., or Circle Inform-A-Gram No. P24.

Man Lifts Power Chuck

Here's a new 15" gibbed-keyway aluminum body chuck that a man can lift. It weighs 145 lbs instead of the usual 200 lbs, gives quicker starts, has higher gripping power at high speeds, needs less power, and cuts down machine brake wear and maintenance. Get details from Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich., or Circle Inform-A-Gram No. P25.

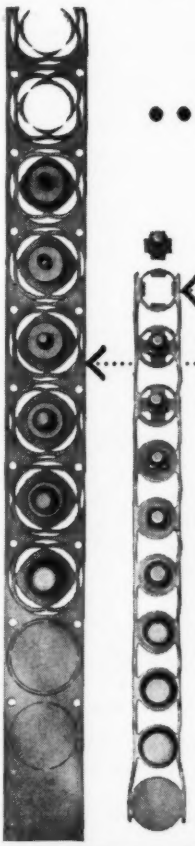
New Valve Sizes

Two new standard pipe sizes have been added to the line of Nopak-Matic valves. These 1" and 1¼" valves come in master, single solenoid, and double solenoid styles and large body orifices are capable of passing large volumes of air or hydraulic fluids. Recommended for fast cycling of large bore cylinders. Galland-Henning Nopak Div'n, 2753 S. 31st St., Milwaukee 46, or Circle Inform-A-Gram No. P26.



PRODUCE MORE and SAVE MORE

...with Dickerman PRESS FEEDS!



"STANDARD" DICKERMAN DIE FEED

80 strokes per minute on .030" cold rolled steel 3" wide with Dickerman 6 x 4 Die Feed.

45 strokes per minute on .030" cold rolled steel 4¼" wide with Dickerman 6 x 6 Die Feed.

Rugged, dependability built into every one of the 14 standard off-the-shelf feeds give 24 hour a day trouble-free performance.
At any speed the tooling will withstand, where high precision or high production are required, Dickerman Feeds pay for themselves and then go on paying dividends over and over again. Many Dickerman feeds have performed flawlessly for over 100 million strokes.

Improve your press feeding profits —send for the Dickerman "Standard" Catalog File and prices today!

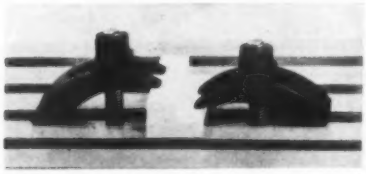
Dickerman

H. E. DICKERMAN MFG. CO.
321-337 Albany Street • Springfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 117

Product News

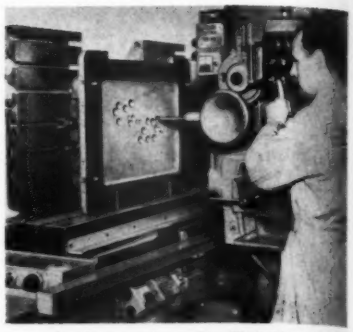
Simple Hold Down Clamps



These Insta-Clamps are fast and simple to operate and can be used without shims. They won't tip over when clamping onto narrow grooves, lodges, or corners and even one prong holds workpiece. Can be applied to jigs and fixtures, used on mills, jig borers, and punch presses. Insta-Clamp Co., 2420 Home Pl., Dearborn 8, Mich., or Circle No. P27.

Direct Dial System

A simple and accurate means of pre-setting dimensions for automatic point-to-point positioning is done with Diatrol, a new direct dial dimensioning system for DeVlieg Spiramatic Jigmils. Diatrol allows direct dialing of positive or negative dimensions from any datum plane within its range. Ideal for jigless boring of custom or small lot jobs. DeVlieg Machine Co., Fair St., Royal Oak, Mich., or Circle No. P28.



Flexible Grinding Wheel

Easily clean and polish contoured metal parts with this slashed version of the Grind-O-Flex flexible grinding wheel. Because the abrasive cloth leaves are cut into thin strips, they mold to irregular shapes and get down into places that formerly had to be hand finished. For a catalog, write Merit Products, Inc., 3691 Lenawee Ave., Los Angeles 16, or Circle P29.

High Stacking Truck

For high stacking of pallet and skidloads of materials use the Barrett Model TTG tilting-type fork hi-lift truck. It comes in 1000 to 3000 lb capacities with varied fork lengths and widths. Get details from Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill., or Circle No. P30.

sure/bore

"Package Plan"

offers...

★ CONVENIENCE ★ EFFICIENCY ★ ECONOMY

NEW PACKAGE PLAN INCLUDES:

Boring Bar "4-some Package"...
4 Boring Bars from 7/8" to1-3/4" dia., with Micrometer adjustment. Tool Bit mounted at 53° or 90° angle. Boring range from 1" to 3-1/8" dia.

Sure-Bore Cartridge "Package"...
"53" or "90" pack includes 3 complete assemblies, cartridges, carbide tool bits, wrenches.

Boring Head "2-some Package"...
includes a 2" and 3" head, 2 long and 2 short tool bits... Boring range 2-3/4" to 5-1/4" dia.

WRITE FOR LITERATURE AND PRICES

PDQ PORTAGE Double-Quick, Inc.

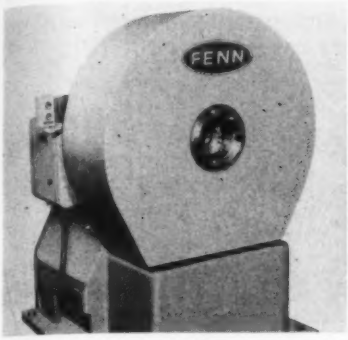
1046 SWEITZER AVENUE • AKRON 11, OHIO

VISIT US AT BOOTH NO. 1845, NATIONAL METAL EXPOSITION

CIRCLE INFORM-A-GRAM KEY NO. 118

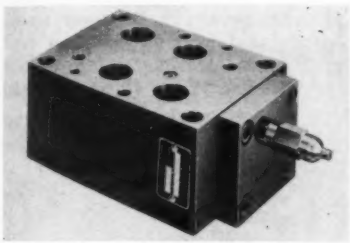
Product News

New Swaging Machines



Use this new stationary four-die swager where it's desirable to keep work from rotating, such as swaging a rectangle from a round stock. Model 4FS also handles other conventional pointing and forming operations from rounds. Other models available from The Fenn Mfg. Co., Fenn Rd., Newington, Conn., or Circle Inform-A-Gram No. P31.

Pipe-Less Valve



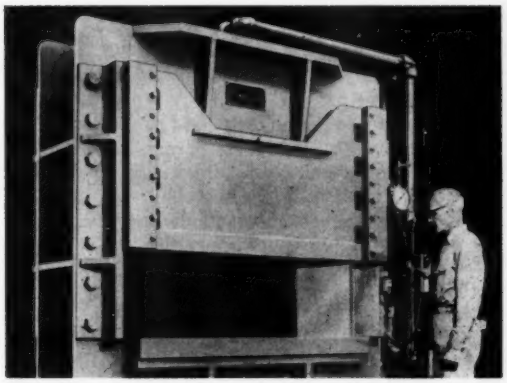
No piping is required to install this new hydraulic pilot-operated pressure relief valve that permits savings of up to 50%. Model BTP-175 CircuitStak is installed in the circuit by being sandwiched between a ¾" gasket-mounted 4-way valve and the sub-plate or manifold. Literature available from Double A Products Co., Manchester, Mich., or Circle Inform-A-Gram No. P32.

Cost Saving Wheel Dresser

A new Dymond Cut wheel dresser increases life and performance of cutting tools and is especially suitable for dressing and truing plate-mounted and pedestal-type grinding wheels. Last Word Sales Co., 18500 Mt. Elliott Ave., Detroit 34, or Circle Inform-A-Gram No. P33.

Expanded Press Line

Straight-side single-action hydraulic presses are now being made in 48 models from 25 to 100 tons. They can be used for trimming, bending, forming, blanking, briquetting, broaching, and forging. Bulletin 5-B is published by K. R. Wilson, Inc., Arcade, N.Y., or Circle No. P34.



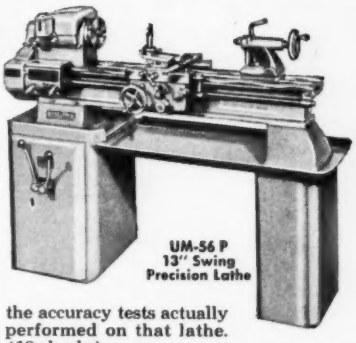
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13"... in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

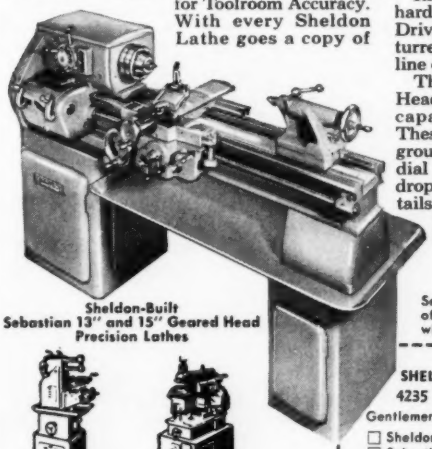
All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of the accuracy tests actually performed on that lathe. (19 checks).



UM-56 P
13" Swing
Precision Lathe

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes

SHELDON
Horizontal Milling Machine

SHELDON
12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

4235 North Knox Ave. • Chicago 41, Ill.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

SHELDON MACHINE CO., INC.
4235 North Knox Avenue, Chicago 41, Illinois

Gentlemen: Please send new catalogs describing:

☐ Sheldon ☐ 10", ☐ 11' ☐ 13" Lathes
☐ Sebastian 13" and 15' Geared Head Lathes
☐ Horizontal Milling Machine ☐ Name of Local Dealer
☐ Sheldon 12" Shaper ☐ Have representative Call

Name ..... Title .....

Company Name .....

Street Address ..... ☐ Company ☐ Home

City ..... State .....

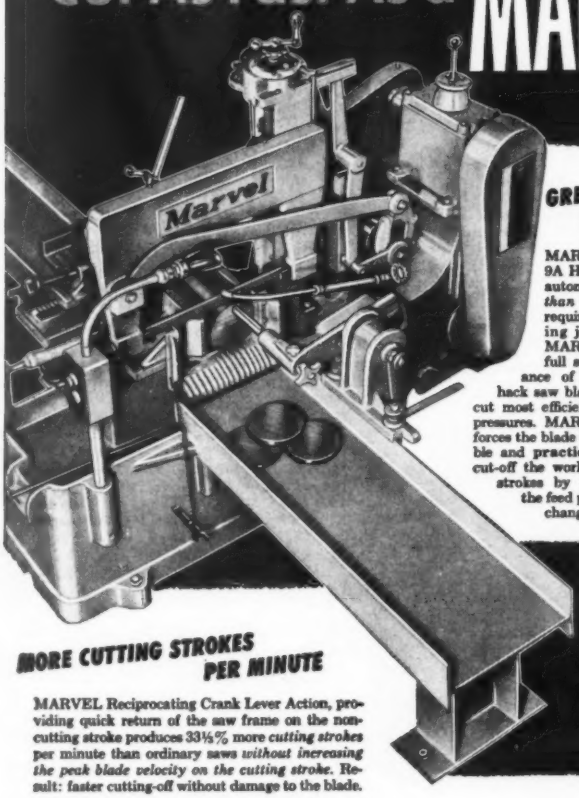
CIRCLE INFORM-A-GRAM KEY NO. 119

Product News

Dividing Heads

A newly developed swivel base is now available for all models of the L-W dividing head line, making them fully universal. They have ball bearing thrust on the worm shaft and gear end of the spindle and the headstock spindle has a threaded nose. Each model has three index plates. L-W Chuck Co., 72 S. St. Clair St., Toledo 4, Ohio, or Circle Inform-A-Gram No. P35.

How Can Any Hack Saw Cut As Fast As a MARVEL?



GREATER EFFECTIVE FEED PRESSURE

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying *more than twice the feed pressure* required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and practical on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

MORE CUTTING STROKES PER MINUTE

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces 33⅓% more *cutting strokes* per minute than ordinary saws *without increasing the peak blade velocity on the cutting stroke.* Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

Write for the MARVEL Catalog and the complete story on MARVEL Metal Cutting Saws

ARMSTRONG-BLUM MFG. CO.
5700 BLOOMINGDALE AVE. • CHICAGO 39, ILLINOIS

P8-1301 Metal Cutting MARVEL SAWS Better Machines—Better Blades

CIRCLE INFORM-A-GRAM KEY NO. 120

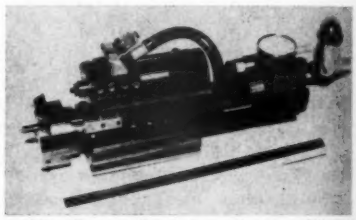
Power Supplies

Less costly to buy and operate, the new power supplies for electrical discharge machining have 75% fewer tubes, produce finer finishes

at roughing rates and allow for easier maintenance because of building block plug-in units. They're sectionalized into split output sections for multiple electrode operation. Elox Corp. of Michigan, 1830 Stephenson Hwy, Troy, Mich., or Circle Inform-A-Gram No. P36.

Trough Vises

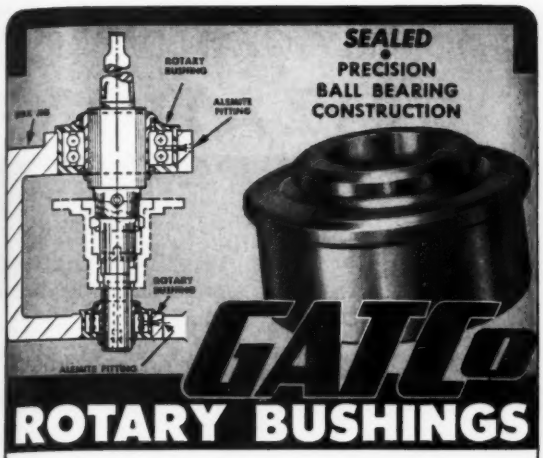
Longer service with lower maintenance and over-all cost are features made possible using ductile iron trough vises. Large troughs



guide the coolant to return without slopping over. Available in jaw capacities of 4" to 8". The Skinner Chuck Co., Dept. D10, 105 Edgewood Ave., New Britain, Conn., or Circle Inform-A-Gram No. P37.

Face-Mill Accurately

This Luft face milling unit can mill, face, counterbore, etc. in any position and is especially good for large pieces, that can be done in 3" to 5" dia. Can be mounted to any job. Get information from Automation Tools Inc., Box 331, La Jolla, Calif., or Circle No. P38.



ROTARY BUSHINGS

For DRILLING, CORE DRILLING, ROUGH and FINISHED DRILLING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both.

Eliminates expensive tool construction — Reduces tool wea — Prevents seizure and pilot breakage — Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.
42322 ANN ARBOR RD., PLYMOUTH, MICH.
GLenview 3-2295

CIRCLE INFORM-A-GRAM KEY NO. 1211

the world's most versatile tools!

IDEAL FOR...
Grinding & Finishing
Buffing & Polishing
Sanding & Brushing
Filing
Mold & Die Work
Tool Maintenance
Deburring
Engraving & Marking

with a wide range of 10 interchangeable handpieces

Send today for the new illustrated catalog showing Foredom Flexible Shaft Machines — and the widest variety of handpieces available anywhere; pencil thin for sensitive control on even the finest work. Small, convenient and precision built to last, this equipment fills many needs at very low cost.

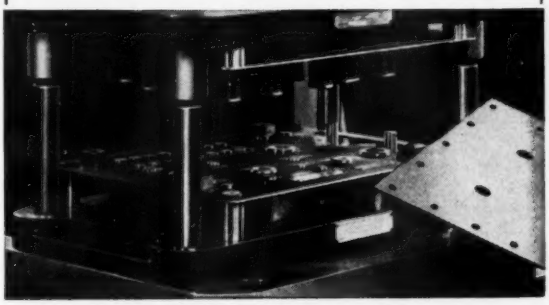
See for yourself when you receive Catalog No. 210.

FOREDOM ELECTRIC CO., INC.
Bethel, Connecticut

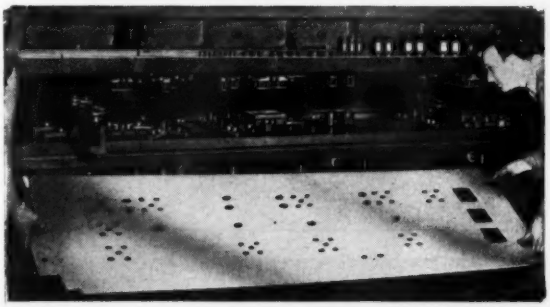
since 1922 SERVICE QUALITY

CIRCLE INFORM-A-GRAM KEY NO. 1212

OVER 2700 PLANTS
are saving money with
WHISTLER DIES



MAGNETIC PERFORATING DIES
All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.



ADJUSTABLE PERFORATING DIES
All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia. Larger sizes available.

manufacturer of all types of CUSTOM DIES for over 40 years

WRITE FOR COMPLETE DETAILS

S. B. WHISTLER & SONS, INC.
748 Military Rd., Buffalo 23, N. Y.

Mail the following: ☐ Magna-Die Catalog ☐ Adjustable Die Catalog
☐ More information on custom die work

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 1213

ARE YOU PROPERLY GEARED FOR

MINIATURIZATION?

SMALL DRILLS MUST BE HELD IN PRECISION COLLETS TO ASSURE ACCURACY

A super-sensitive drill press in which drills are held in precision collets to eliminate chucking errors. Table is keyed to prevent any play. Feed is by raising table. No quill to cause drag.

LEVIN ®

MICRO DRILL PRESS

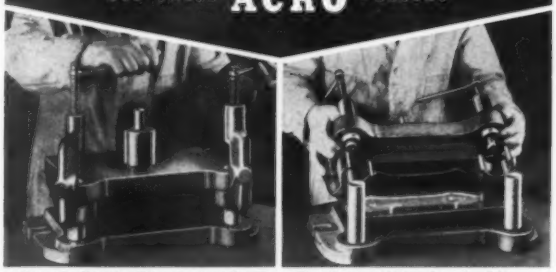
FOR VERY SMALL HOLES DOWN TO .002"

For complete details of Micro-Drilling equipment send for catalog T.

Louis Levin & Son, Inc.
3610 So. Broadway
Los Angeles 7, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1221

FOR EASY, FAST UNIFORM SEPARATION OF DIE SETS...
USE THESE **ACRO** PULLERS



Separate die sets with even upward pull. Die sets separate evenly and safely.

When you have die set pullers that remove the punch holder from the die shoe by a straight upward pull and the punch holder slides upward from the die shoe simultaneously and safely from both leader pins, you have Acro Die Set Pullers and you're saving time.

If you're not, this is how it's done with Acro Pullers: *Indexed* screw wrenches act as indicators, controlling the upward travel. This is an exclusive patented Acro feature and found only in ACRO DIE SET PULLERS. It may pay you to investigate. Write for further free information today.

OTHER ACRO TIME SAVERS FOR YOUR SHOP include Acroflex, drill rod racks, leader pin oilers and wing nuts. Write for complete descriptive folder. Ask for bulletin TP59.

ACRO METAL STAMPING COMPANY
3387 E. Reservoir Ave., Milwaukee, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1222

WAIT! Save Money!
DO THAT JOB FASTER AND BETTER WITH A Severance MIDGET MILL!
Ask for a SEVERANCE catalog today! YOU'LL FIND IT DETAILED, WELL ILLUSTRATED, SUGGESTIVE AND INFORMATIVE. IT INCLUDES LOW REGRINDING PRICES
YES, A SEVERANCE MIDGET MILL MAY WELL SOLVE YOUR PROBLEM AND SAVE YOU MONEY, IF YOU MUST REMOVE GATES, FINS, AND RISERS; BREAK SHARP CORNERS AND EDGES; MACHINE CARBON; FINISH CASTINGS OF ANY MATERIAL; WORK FILLETS, RADII, AND GROOVES; DEBURR OIL HOLES; BLEND WELDED AND ASSEMBLED PARTS; REMOVE FLASH; SMOOTH WELD BEADS; OR ANY OTHER SIMILAR OPERATIONS
MANY STANDARD SHAPES & SIZES TO CHOOSE FROM
SPECIAL SHAPES & SIZES AVAILABLE ON SHORT NOTICE
Severance MIDGET MILL SET NO. 77
SEVERANCE MIDGET MILL SET NO. 77 IS A POPULAR SET OF 1/2" DIAMETER, 1/4" SHANK, HIGH SPEED MIDGET MILLS. MAKES A FINE GET-ACQUAINTED-SET AND WILL COVER A BIG MAJORITY OF YOUR NEEDS FOR THIS TYPE TOOL. LEAFLET NO.651 GIVES DETAILED INFORMATION AND PRICES. ASK FOR IT TODAY!
Severance TOOL INDUSTRIES INC.
730 IOWA AVE. — SAGINAW, MICHIGAN
CARBIDE HAND FILES
REGRINDING
INSIDE DEBURRING CUTTERS
OUTSIDE DEBURRING CUTTERS
HAND DEBURRING CUTTERS
TUBE END DEBURRING CUTTERS
CHATTER-FREE ECONO-SHANKS
SPECIAL CUTTERS
MICRO-MILLS & BORE-MILLS
BALL SEAT REAMERS

CIRCLE INFORM-A-GRAM KEY NO. 1223

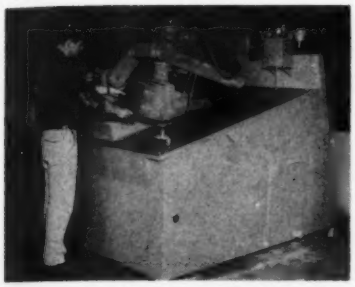
Product News

Produces Many Dies

This Electrical Discharge Machine Tool series produces extrusion dies, powdered metal dies, cold heading dies, blanking dies, and multiple pierce dies. Has 7" x 17" or 12" x 18" work surface and 10" quill travel. Get details from The Elox Corp. of Michigan, 1830 N. Stephenson Hwy., Troy, Mich., or Circle Inform-A-Gram No. P39.

High Speed Finisher

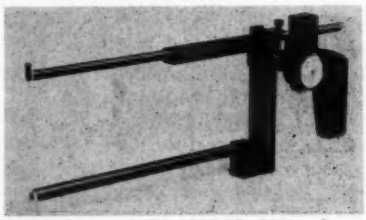
A New High-Speed Dual-Spindle Deburring and Finishing Machine handles low production of different



parts and/or high production of a single part. Model MM-1-2, at a 15 sec time cycle, produces 240 pcs/hr per spindle at 100% efficiency. Catalog available from The Mecha-Finish Corp., P. O. Box 308, Sturgis, Mich., or Circle No. P40.

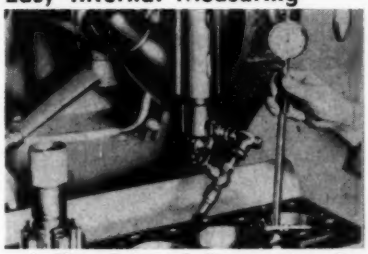
Deep Hole Bore

For speedy, accurate measurement of grooves, bores, counterbores, recesses, and hard-to-reach bores, use this new deep bore gage. It can be used at machine or inspection table and requires no special skill to obtain accuracy. Offered in three sizes. Mueller Gages Co., Div'n of Mueller



Laboratory, 1052-1058 N. Allen Ave., Pasadena, Calif., or Circle Inform-A-Gram No. P41.

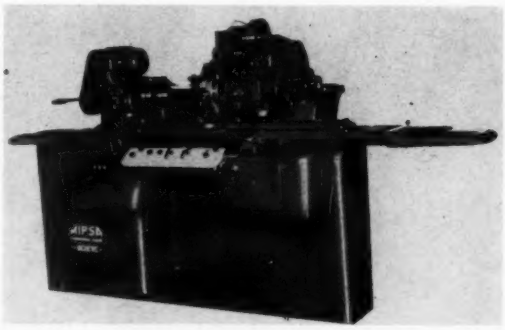
Easy Internal Measuring



A New Internal Comparator, Intramess, measures to 0.000050" accuracy for checking size, out-of-roundness, bellmouth, and taper at any diameter and any depth within a 0.060" to 10" range. Just introduce the gage into the bore, rock it in the bore, and read the dial. Literature available from Mahr Gage Co., Inc., 274 Lafayette St., New York 12, or Circle No. P42.

Versatile Universal Grinders

Increase production without sacrificing accuracy by using the MIPSA universal grinding machine. It features hydraulic operation, double swivel wheel head that permits simultaneous grinding of shoulder and OD, and another grinding wheel for flange and similar grinding. Alina Corp., 122 E. 2nd St., Mineola, L.I., N.Y., or Circle No. P43.



Amcor Roller Stock Pushers

FOR POSITIVE STOCK ALIGNMENT

5 IMPORTANT ADVANTAGES

- LOW COST — costs only a fraction of hand-made pushers
- SIMPLICITY OF INSTALLATION — requires milling of one slot and drilling of one hole
- COMPACT — engineered and manufactured for minimum space requirements
- ANTI-FRICTION — hardened roller on brass shaft requires minimum effort to insert and feed stock
- MINIMUM DIE MAINTENANCE—no refitting necessary when die is sharpened . . . increases pilot life

Write us for complete information

APPLIED MECHANICS CORPORATION
528 Fourth St., N.W., Grand Rapids, Mich.
Telephone GLendale 9-8544

Distributor inquiries invited
CIRCLE INFORM-A-GRAM KEY NO. 1231

RI FOR INTERNAL INSPECTION

● 0.10" AND UP . . . That's the point of entry requirement . . . to provide your inspectors the chance to use the outstanding National Fontar Borescope and thus give them the brightest, distortion-free, close-up view of the defect in "inaccessible" interior surfaces of the cast, drawn, welded or molded product . . . from inches deep to many feet.

Find out how its use can be a time and cost saver while it up-grades your Quality Control. Just send for our "Borescope Catalog."

ENGELHARD INDUSTRIES, INC.
NATIONAL ELECTRIC INSTRUMENT DIVISION
92—21 Corona Avenue • Elmhurst 73, New York

CIRCLE INFORM-A-GRAM KEY NO. 1232

New!
ONLY..... **$15** ★

Buys This Compact Mist Coolant Unit

*Complete With Magnetic Nozzle Holder As Shown (In U.S.A.)

Especially designed for small precision machinery used for drilling, tapping, sawing, grinding, etc. Up to 500% savings through increased cutting speeds and tool life. Check these quality features and write for complete details.

- *compact . . . measures 3" x 5"*
- *separate air and coolant controls*
- *convenient mounting stud*
- *attaches to existing shop airline*
- *shatter-proof 8 oz. reservoir*
- *neoprene flexible coolant line*
- *magnetic nozzle holder positions anywhere*
- *controlled discharge*

Larger Types and Capacities Available

SEND FOR BULLETIN NO. 37

TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1241

Vernier Layout Compass

Accurate to 0.001

Invaluable for laying out circles and radii—for template layout and optical comparator charts. Two sizes; 6 inch and 12 inch. Scales read to 1/1000 inch. Packed in wood case including Phonograph needle points and scriber. Write for literature.

Dealer Inquiries Invited

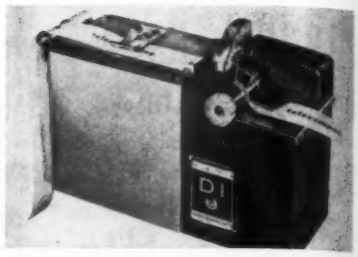
TITAN TOOL SUPPLY CO.
Box L, 1419 Hertel Avenue, Buffalo 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1242

Product News

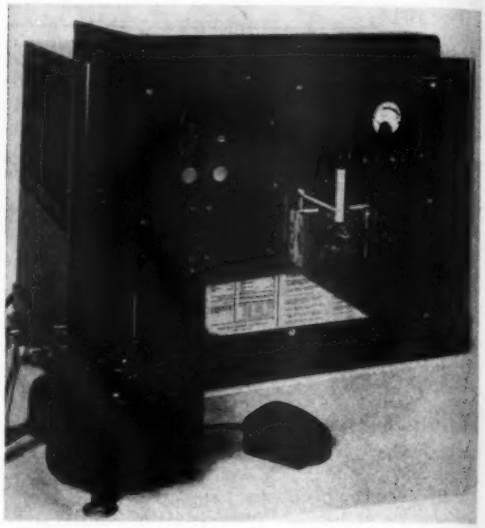
Features Fast Punching

A High-Speed Tape Perforator with 40 columns/sec punching speed requires only one eccentric and one cam-generated motion to produce high punching speed and long life. Sealed ball bearings minimize lubrications and carbide inserts are used at critical wear points. Data Instruments Div'n, Telecomputing Corp., 915 N. Citrus Ave., Los Angeles 38, or Circle Inform-A-Gram No. P44.



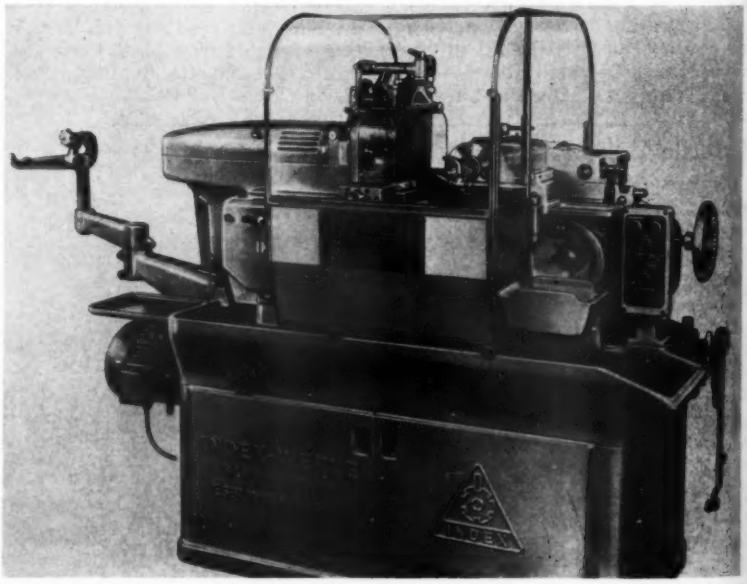
Bench-Type Generator

New 2-kw output bench-type generator has unique two-position transfer switch that's good for high production brazing, hardening, soldering, and forging operations. The patented transfer switch can handle two work coils so the operator can heat alternately to save time. It also has an automatic timer that can be preset for various timing operations on a production line basis. Induction Heating Corp., 181 Wythe Ave., Brooklyn, N.Y., or Circle No. P45.



New Automatic Screw Machine Models

New Index automatic screw machines offer ¾" and 1" dia bar stock capacity and can be equipped with outside feeding attachment for up to 1 3/16" dia. Models C 19 and C 29 feature new overload clutch and cut-out device for the cam shaft to prevent damage, a wide range of spindle speeds, and rigidity to permit use of carbide tools. The Wickman Products Corp., 10325 Capital Ave., Oak Park 37, Mich., or Circle P46.



quicker precision tapping CUTS COSTS

$59.50 FOB FACTORY

Dahlstrom Tap Guide

- *Do precision tapping by hand*
- *Tap by lathe with spindle*
- *Tap through open bases for big jobs*
- *Carry to jobs or fasten to bench*
- *Serves as a handy tap extension*

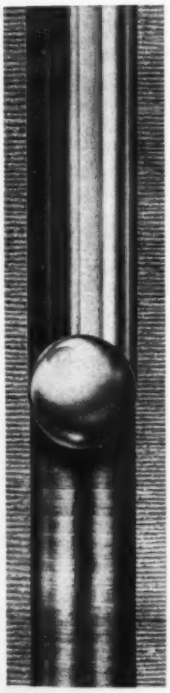
REDUCE TAP BREAKAGE IN YOUR SHOP!

The Dahlstrom Tap Guide works straight and square to eliminate most costly tap breakage. Anyone can operate it—just slip a tap and adaptor into the spindle and turn the handle. Equipped with nine adaptors from 8-32 to ¾" (taps not furnished) . . . depth of throat 7½", opening 7" . . . 8 x 11¼" table area . . . wt. approx. 32 lbs. Order this tap-protecting time saver for YOUR shop.

Ask for the illustrated bulletin that includes information on the $1.75 Dahlstrom Automatic Stock Feed Stop.

Branch MANUFACTURING COMPANY
16 Olsen Drive, North Branch, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1251



GOOD HOLES MADE BETTER

For holes requiring *additional accuracy, smoother finish,* or *greater wear resistance,* BALLIZING is the answer — and only ballizing gives *all three* of these advantages.

This process is also *faster* and far *less costly* than any other method of final hole sizing and finishing.

Investigate! WRITE TODAY for FREE 16-PAGE BALLIZING BULLETIN. It describes the process fully; gives cost and production data.

INDUSTRIAL TECTONICS, Inc.
ITI
MANUFACTURERS OF PRECISION BALLS AND BEARINGS
3697 JACKSON ROAD
ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1252

SPECIALISTS IN Carbide Tipped and Solid Carbide CUTTING TOOLS

It costs no more to enjoy the production advantages of MEYCO tools: "precision" minded since 1888, careful workmanship, well equipped shops and capable design engineers . . . all add up to plus values for you.

The finest quality and proper grade of tungsten carbide is engineered to the cutter's job. Tools are precision ground and lapped for long life, tipped to carefully machined bodies balanced for rigidity. MEYERS works to tolerances of .0001", tipped cutters as thin as .030", solid carbide cutters much thinner, diameters of ¼" and up.

Your special problems in the field of cutting, slitting, slotting, under-cutting or form-cutting are solicited.

Write for new Cutter Catalog No. 51

W. F. MEYERS CO., INC., BEDFORD, IND.

CIRCLE INFORM-A-GRAM KEY NO. 1253

FREE WALL CHART
MARSHALL
Ground Flat Stock
COMPETITION
BRINGS OUT THE BEST IN EVERY COMPANY
MARSHALL STEEL COMPANY specializes in the production of Ground flat tool steel, Drill Rod and allied products. Since 1945 Marshall Steel Co., has grown to FIRST PLACE in the production of velvet finish ground flat tool steels.
DID YOU KNOW THAT . . .
Marshall was FIRST to produce wide sizes.
First to produce thicknesses over ½ inch.
FIRST to offer long lengths from stock for economy.
FIRST to furnish 5% chrome Air Hardening steel in finished ground form.
FIRST to supply 5% chrome AIRcrat Hardening tool steel in both 18" and 36" lengths.
FIRST to manufacture LOW CARBON 1018 steel for applications not requiring hardening.
FIRST to safety wrap in Aluminum Lined rustproof wrappings.
LEADERSHIP—often copied—never equaled!
This is why—Marshall Steel Company has grown to be the largest producer of Ground Flat Tool Steel.
FOR YOUR CONVENIENCE write for colorful wall chart with all sizes and grades.
We invite comparison—write for complete catalog of products.

Em-blem of Excellence
MARSHALL STEEL COMPANY
BOX 108-TP, LaGrange, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1254

CAMS
To Your Specifications
• • •
— Except Screw Machine Cams —
• • •
Design Assistance Offered
KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1261

MINIATURE DRILL BUSHINGS
Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths ¼" to 3"
.0002 Tolerance on I.D.
O.D., and Concentricity
Specials to your specifications
WRITE FOR CATALOG
PREBCO BUSHING CO.
14702 East Arrow Hwy., Baldwin Park, Cal.

CIRCLE INFORM-A-GRAM KEY NO. 1262

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 1263

HOLES
WITH PRECISION ADJUSTMENT
M-3 H.S.S. OR CARBIDE

Clark "FINISHING CUTTERS"
P. O. BOX 990 BEVERLY HILLS, CALIFORNIA

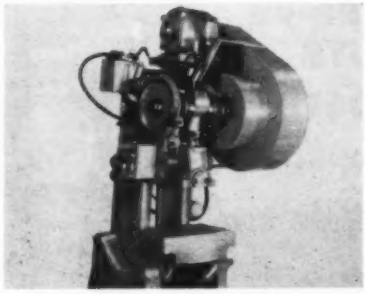
CIRCLE INFORM-A-GRAM KEY NO. 1264

LIFTING DEVICES
for
FAST • SAFE • BETTER
Material Handling
of
• SHEETS
• COILS • BOXES
• MOLDS
• DRUMS • PALLETS
400 MODELS
H. L. Bushman Co.
100-A W. Central Ave.
Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1265

Product News

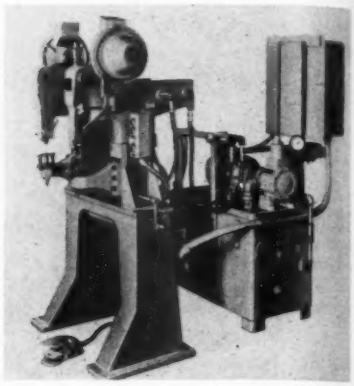
Power Press Line



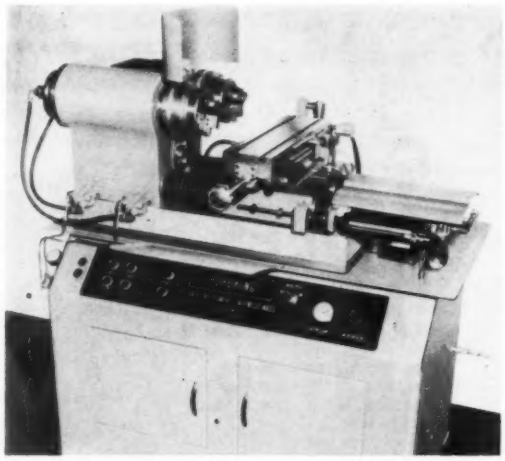
Pneumatic Friction Clutch and Brake are features of a line of power presses that range in size frm 6 to 18 tons in bench or floor models. The clutch and brake offers rated capacity at up to 40% less cost than other types. Bulletin available from Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis., or Circle Inform-A-Gram No. P47.

New Dual Riveter

All hydraulic and electrical equipment and controls on Model HDR dual riveter can effectively speed up



production line or unit machine riveting jobs. It's tooled to utilize and set two ¼" dia solid steel rivets, gravity fed from two 10" hoppers. Tomkins-Johnson, Jackson, Mich., or Circle Inform-A-Gram No. P48.

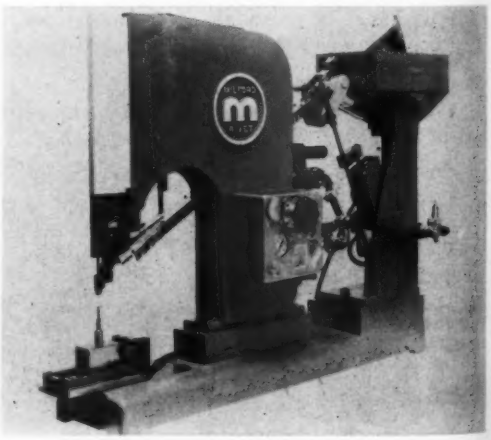


Automatic "Boreking"

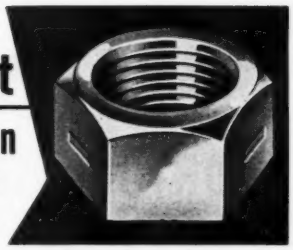
Complete finishing operations on a blank in one cycle with this precision boring, turning, and facing machine. While front of the piece is being finished on one spindle, the reverse side is done on the other. Operations can be combined in a variety of ways. Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, or Circle No. P49.

Pneumatic Riveter

A blade hopper attachment is featured on the Model 56-BH riveter which has a narrow machine front allowing for single or multi-spindle arrangements. Variety of applications possible. The Milford Rivet & Machine Co., Milford, Conn., or Circle No. P50.



NEW Centerlock Nut saves production time... speeds application



Here is a new low cost lock nut that can be applied from either end, double chamfered, with the locking feature in the center. The greater speed in application of these Centerlock Nuts can make definite savings in production time and provide low cost fastening. Ideal for customer assembled products.

The New Centerlock...

• Can be automatically fed • Will lock wherever turned on bolt • Does not depend on friction against work for locking • Can be applied from either end • Will not damage bolt threads • Available in steel, Brass, aluminum or stainless on special order • Offered in finished series, double chamfered from ¼" thru ⅞" in fine or coarse threads. Machine screw sizes #8, #10, and #12 also available. Heavy series made to special order only • Also in closed and open end acorn type • Large inventories carried for immediate shipment. 119

Write for samples and NEW CATALOG today

GRIP NUT COMPANY
107 Maple Ave. South Whitley, Indiana

CIRCLE INFORM-A-GRAM KEY NO. 1271

More per hour with MEAD WORK FEEDERS

Feed work fast to drill, tap, broach, mill. Delivers, holds, ejects stampings, castings, screw machine parts up to 3"—thousands per hour. Combines with MEAD Timers and Drill Press Feeds for easy, cost-saving automation.

Send for new Air Power catalog today!
(See Thomas' Register for nearest distributor's address, phone number.)

MEAD SPECIALTIES COMPANY
4114 N. Knox Ave., Dept. HA-109, Chicago 41, Ill.
PATHFINDER IN AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 1272

The Most Complete Line of— **IMPREGNATED MOUNTED DIAMOND WHEELS**
(Resin and Al-Aloid Bond)
AVAILABLE ANYWHERE

For—
INTERNAL • PROFILE
• FORM GRINDING ON CARBIDES, CERAMICS OR HARD STEELS

Also ideal for electro-assist and electrolytic grinding. A higher quality at lower cost. Over 3000 different shapes and sizes available. Diamond sizes from 46-mesh to 6400-mesh, man made or natural diamonds at same cost.

FOR PRICES WRITE

8217 N. KIMBALL AVE.
SKOKIE, ILLINOIS

A.I.T. 102
Diamond Tool co.

CIRCLE INFORM-A-GRAM KEY NO. 1273

Aget offers more! Over 38 standard Dustkop models to choose from . . . *Plus* engineering service to help you select, provide, and install the proper accessories and fittings to complete your dust collecting system. Write for illustrated folder . . . Today!

AGET MANUFACTURING COMPANY
1394 E. CHURCH STREET • ADRIAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1274

ACME TAPS
From Stock!
HIGH PRODUCTION TYPE
with Exclusive
"Lead Screw Pilot"

Improve Acme Tapping with Single Pass Acme Taps. Eliminate Shaved Threads, Improve Finish, Reduce Machining Time.

H&R
The Threading Specialists
5850 Marshall St., Oakland 8, California
OUR 23RD YEAR

CIRCLE INFORM-A-GRAM KEY NO. 1281

SAVE 50%
or more in
CONTOUR GRINDING COSTS with VISUAL GRIND

Sold by
Brown & Sharpe Mfg. Co.
Providence, Rhode Island

Visual Grind is manufactured by
The CLEVELAND GRINDING MACHINE Co.
30510 LAKELAND BLVD. • WILLOWICK, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1283

BURR-BIT CUTS TAPPING COST WAY-DOWN!

Just lock Burr-Bit on any make tap and holes are deburred automatically, leaving a smooth clean chamfer. ONE OPERATION, ONE SETUP. ONE HANDLING.

NEW ADDITION
Now Burr-Bit fits 3 fluted taps from #6 to ½". Also available to fit any tap 2 or 4 fluted from #2 to ¾".

A quality product made of the finest high speed tool steel for use on almost every material.

WRITE now for complete data and reports from engineers who have adapted Burr-Bit and saved on their tapping operations.
INVESTIGATE Burr-Bit-today.

VERNON DEVICES, Inc.
281 E. 3rd Street Mt. Vernon, N.Y. MOunt Vernon 4-1686

CIRCLE INFORM-A-GRAM KEY NO. 1282

GAGE COMPANY *Deep-Etch*
PRECISION PLASTIC • NON-BREAKABLE
COMPARATOR SCALES

Highly accurate and designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

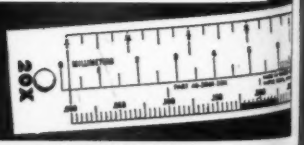
Supplied on Gage Company Precision Plastic . . . a sturdy, non-breakable material of constant stability, .125 in thickness.

Unexcelled as a tool for use in drafting and engineering scale layouts for use on comparators.

Available in all standard magnifications and in several lengths. Various styles for all applications.

WRITE FOR BULLETIN NO. 58-70

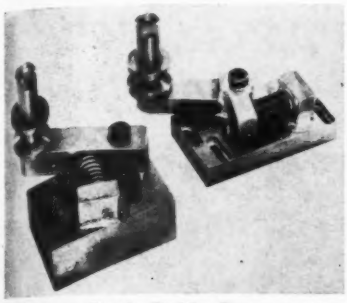
GAGE COMPANY
• • • BOX 1080
Battle Creek, Michigan



CIRCLE INFORM-A-GRAM KEY NO. 1284

Product News

Press Stock Guide

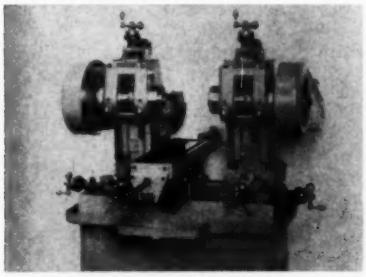


A New Stock Guide Compensator applies constant spring pressure to coil or strip stock as it's fed into die and is applicable to automatic stamping operations. They mount on the die shoe and hold either coil or strip stock under proper tension as it moves into the press. Jolico Industries, 6345 Balfour Ave., Allen Park 10, Mich., or Circle No. P51.

Long-Stroked Tool

The New Pneu-Hydra Tool is a new pull-action type that features a longer work stroke for quicker fastener installation. Model 200 is automatic, has a 1¼" working stroke, and is long enough to complete installation in single reciprocation. Huck Mfg. Co., 2380 Bellevue Ave., Detroit 7, or Circle Inform-A-Gram No. P52.

Dual-Head Miller



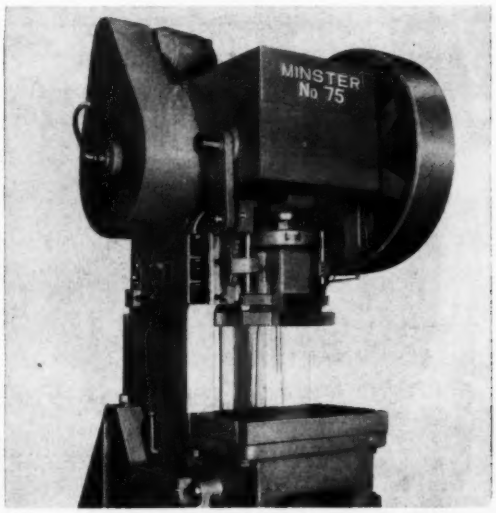
Speed Milling Operations up to 100% and reduce operator materials handling by 50% using the A.M. dual-head milling machine. Seven movements can be operated air hydraulically. Each head can be raised from 2" to 8" from the top of the 20" x 6" table. Barker Engineering Co., 500 Green Rd., Cleveland 21, or Circle Inform-A-Gram No. P53.

New Chipbreaker Drill

To cut drilling costs and increase production use the new Speedicut Chipbreaker drill that gives from 50% to 400% higher feed rates and more holes drilled per regrind. Sizes from ¼" to 4" available. Speedicut Div'n, Chicago Heights Steel Co., Chicago Heights, Ill., or Circle No. P54.

New Press Lube System

A new 75-ton single-geared OBI press features an optional recirculating lubricating system, which continuously lubricates main and connection bearings, gibs, gears, and counter-balances. Enclosed in press frame, it lowers maintenance and clean-up costs and gives longer press life. Model 75 has an improved standard modified flanged slide which gives larger die area and an exclusive lower connection ball box adjustment. Minster Machine Co., Minster, Ohio, or Circle No. P55.



Buy DURANT

PRESS ROOM EQUIPMENT

WIRE STRAIGHTENERS
Takes round or flat wire and tubing. Rolls adjustable by means of socket set screw. For use with automatic Slide, Roll or Hitch Feeds. Units available with 5, 7, 9 or 11 grooved rolls.

MOTOR DRIVEN STOCK STRAIGHTENERS
For all thin materials. Entering rolls power driven; top rolls are individually adjustable for stock thickness. Available in eight sizes.

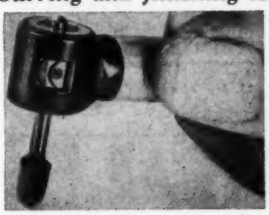
SWEEP GUARDS
A positive safety guard on power presses. Easily installed. Downward motion of ram removes operator's hands. Rugged—withstands jarring impact of press. Needle bearings in guard housings assures long life.

Write Now for new catalog showing prices and complete line of Equipment.

DURANT Tool Supply Co.
11 Thurbers Ave., Providence 5, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1291

Airburr
miniature high speed deburring and finishing tool



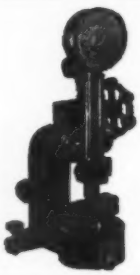
Here is a small, light rotary tool for deburring and light grinding in tight places. Speeds from 30,000 to 150,000 rpm allow small wheels and burrs to operate at correct surface speeds. Operates on air pressures from 10 to 100 lb/sq. in. with low air consumption.
If your dealer cannot supply you write us for further information.
ELLISON ENGINEERING CO.
4530 San Fernando Road
Glendale 4, California

CIRCLE INFORM-A-GRAM KEY NO. 1292

CAMS ALL TYPES MADE TO YOUR SPECS

"Cam Calculating Service"
Dr. Chas. Eisler ME, Founder
Chas. Eisler, Jr., Pres.
EISLER ENGINEERING CO., INC.
732 SO. 13TH ST. NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1301



HARDNESS TESTING
has been done with the SCLEROSCOPE
Since 1907
•
THE SHORE INSTRUMENT & MFG. CO., Inc.
90-35 Van Wyck Expressway
Jamaica 35, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1302

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have
22 Jig Borers
KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1303

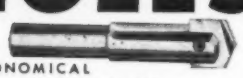
New Ideas in Cutters

★ Designers and manufacturers of H. S. S., tantung, and carbide cutters based on cost saving principles. Form relieved, hard faced cutting edges, throwaway inserts, welded bodies, semi-finished blanks, clamped-on blades. Serving America's metal working, carbon, graphite, valve, and instrument manufacturers. Write or phone LUdlow 8400 for latest catalog.

NIAGARA CUTTER
Division of Bollier-Dumerell, Inc.
338 Niagara St., N. Tonawanda, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1304

HOLES



ECONOMICAL
FAST DRILLING
IN DEEP HOLES
Clark "SPADE DRILL"
P. O. BOX 990 BEVERLY HILLS, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1305

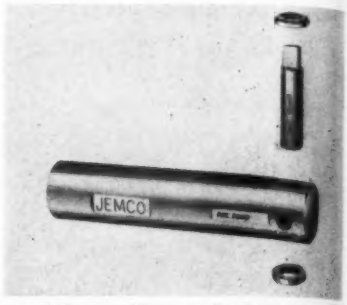
Product News

Helps Tap Hard Metal

New Aerosol Tapping Compound, Tapit, facilitates tapping hard metal like chrome and molybdenum steel alloys, and beryllium copper. It makes tapping easier because it tends to penetrate more fully into threads and recesses and leaves a thin lubricating film on the work. Perc. E. Harms Co., Northfield, Ill., or Circle Inform-A-Gram No. P56.

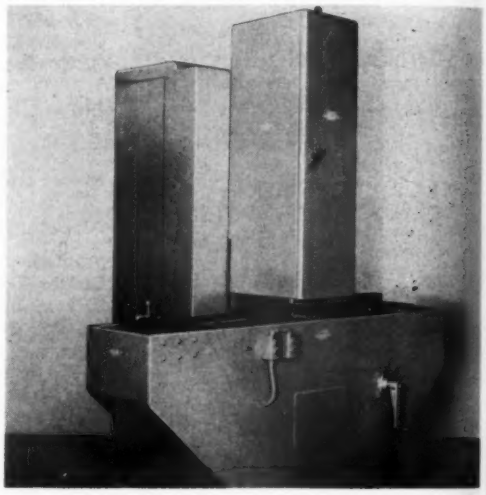
New Micro-Tool

Better calibration is possible with this cutting tool because of dual dial calibration nuts which allow adjustment from either end of the tool to eliminate adjustment problems due to difficult clearance. No special tooling is required. Micro Tool Div'n, James Engineering & Machinery Co., 2451 Monroe Blvd., Dearborn, Mich., supplies catalog, or Circle Inform-A-Gram No. P58.



Finishes Flat Surfaces

A new abrasive belt grinding, polishing, and deburring line is for flat surfaces of bars, strips, coils, blanks, etc., up to 15" wide and 8" thick. Model KC (pictured) has conveyor belt feed and Model KP has pinch-roll feed. Acme Mfg. Co., 1400 E. 9-Mile Rd., Detroit 20, or Circle Inform-A-Gram No. P57.



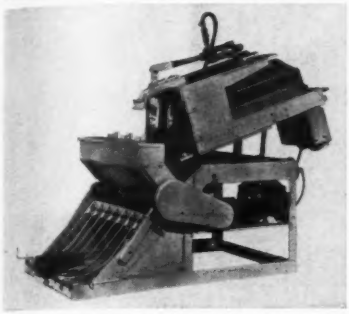
Air and Hydraulics Calculator

Easily determine cylinder diameter and displacement in air and hydraulic equipment with this handy slide-type calculator. Velocity, pipe area, and pump delivery can also be found. Get your calculator from Logansport Machine Inc., or Circle Inform-A-Gram No. P59.

Product News

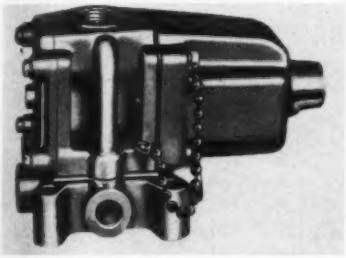
New Feeding Equipment

This machine saves time in the pressroom by feeding one coated blank to the operator each time the



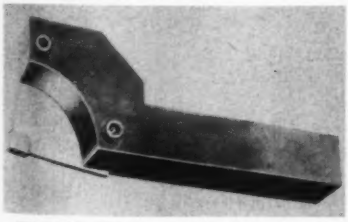
press is tripped. It's made up of two units, the Feed-a-Blank and the Coat-a-Blank. Either can be used separately. Get data from Superior Machine & Tool Products Div'n, 3225 32nd St., Grand Rapids, Mich., or Circle Inform-A-Gram No. P60.

Heavy-Duty Valves



Especially good for automatic assembly machines and packaging operations and other applications are the new low-cost air valves introduced by Numatics, Inc., Highland, Mich. The SA Junior series are precision-built for rugged service. Write company for data, or Circle Inform-A-Gram No. P61.

Four Cutoff Tools



The Non-Flex cutoff tool is used on turret lathes and automatic screw machines. Hardened steel support located directly below cutting tip provides extreme rigidity to permit use of any grade of carbide or Tantung. General Machine Co., Inc., Emmaus, Pa., or Circle No. P62.

Foremost Toolmakers Approve Sentry Hardening

Visit Booth 1719
41st Metal Show, Chicago, Nov. 2-6

LOOK into some of America's leading tool rooms to learn how to make your production tools the finest! You'll find that many of the foremost hardeners entrust their precious high speed tools only to the Sentry Diamond Block method of atmosphere control.

The reason why? Sentry hardening is sure. Valuable tools of any steel hardening above 1700°F. can be fully hardened without danger of scale or decarburization. Surface spoilage is positively eliminated.

A demonstration of hardening on your own tools will convince you of Sentry benefits. Why not send us samples?

Sentry ELECTRIC FURNACES
TRADEMARK

Request Catalog R-42 · Write THE SENTRY CO., FOXBORO, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1311

TRIED • PROVEN • GUARANTEED
MICRO MINIATURE END MILLS

2 Flute Flat End Single End
3 Flute Ball End Double End
4 Flute ⅛" Shank 3/16" Shank

Stub Length—1/32" Increments from 1/32" to 3/16"

Now 1/64" Increment Sizes in 2 Flute Single End type

When you think of small END MILLS —think of MICRO MINIATURES®

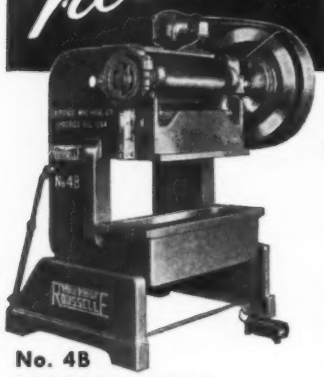
DISTRIBUTORS *in principal cities*

Write for Catalog

WOODSON TOOL CO. 4811 Lennox Blvd. Inglewood, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1312

New 40-TON DOUBLE CRANK O.B.I.
ROUSSELLE



WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

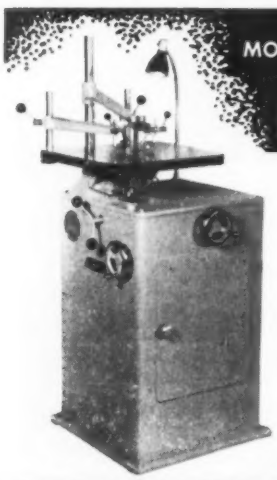
- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

No. 4B
ROUSSELLE PRESS

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

SERVICE MACHINE CO.
Mfrs. of Rousselle Presses
2310 WEST 78th STREET • CHICAGO 20, ILL.

ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS
CIRCLE INFORM-A-GRAM KEY NO. 1321



MODEL PDM RICE MILWAUKEE
PUNCH and DIE MAKER

The Complete Low-Cost Answer to Your Larger Die-Making Problems

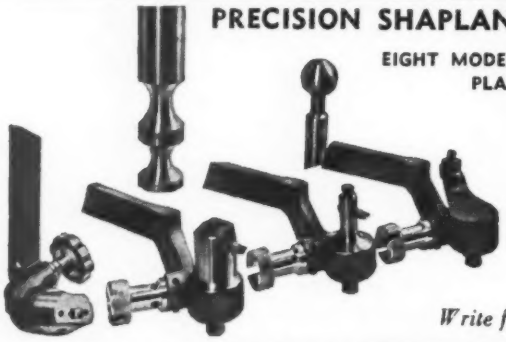
★ Tilting Power Ram Permits Working from *Level* Table
★ Infinitely Variable Speed Transmission and Stroke Mechanism
★ Files Supported in both Upper and Lower Chuck . . . or in either
★ Saws to Center of 22½" Circle with Overarm, 28" with overarm removed
★ 20" square table — Special table available in 24" x 28" size

Send for PDM Bulletin, also Bulletins on Rice — Milwaukee Complete line of bench type Die Filers and Profile Grinders.

RICE PUMP & MACHINE COMPANY
228 PARK AVENUE BELGIUM, WISCONSIN
CIRCLE INFORM-A-GRAM KEY NO. 1322

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: ⅜" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

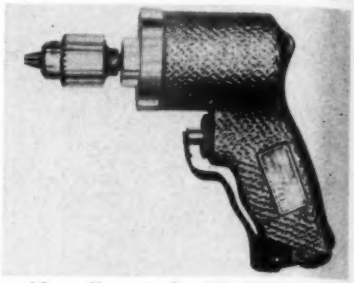
Write for circular

Patent Pending C. B. TEETER - Tool Room Specialties
3443 N. Greenview Ave., Chicago 13, Illinois • Phone DRexel 3-3571
CIRCLE INFORM-A-GRAM KEY NO. 1323

Product News

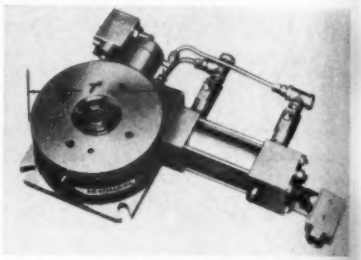
Dual Sander-Drill

This handy tool does sanding, sheet metal buffing, deburring, and light



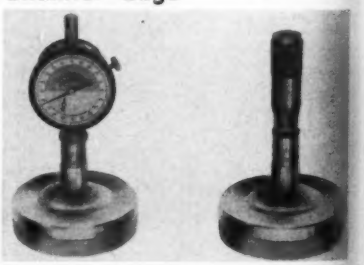
weld scaling, and with ¼" drills it can be used on light sheet metal, galvanized, and aluminum sheet or tubing. Superior Pneumatic & Mfg. Inc., 13800 Enterprise Ave., Cleveland 35, or Circle No. P63.

Small Index Table



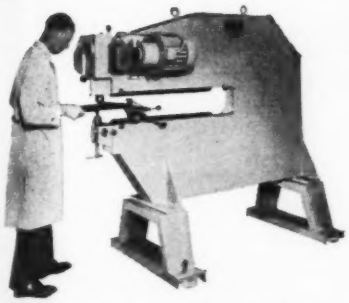
Up to 75 indexes/min and 100 lbs maximum work load can be handled by the new heavy duty 7" index table. Model 700 has a maximum power stroke of three times line pressure and 4, 6, 8, or 12 standard stations. Air Hydraulics, Inc., 676 Hupp Ave., Jackson, Mich., or Circle Inform-A-Gram No. P64.

Chamfer Gage



A major diameter capacity of 2" to 3" is provided by the new chamfer gages for precisely measuring machine setups to control depth of chamfer. Two styles measure angles from 0° to 90° to 127°. Acme Scientific Co., 1450 W. Randolph St., Chicago 7, or Circle No. P65.

NOW! BUY ONE PULLMAX MACHINE

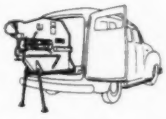


DO ALL THESE JOBS

Dishing
Beading
Louver Cutting
Irregular or Freehand
Edge Bending
Nibbling
Flanging
Slot Cutting
Joggling or Offsetting
Inside Square Cutting
Straight Cutting
Circle Cutting

Now you can do all this work on one machine—save time, labor and material as well as expensive die costs. Cuts mild steel up to 13/32". 8 sizes of machines to choose from.

Write for demonstration.
We'll send a Pullmax demonstrator to your plant. Just tell us when.
16mm Sound Movie Available



Write for Free catalog on Metalworking Ideas

AMERICAN PULLMAX CO., INC.
2469 N. Sheffield Ave., Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1331

Comet® BORING TOOLS

(H.S.S. and Carbide)
for Holes from 1/16" upward

Standard and Special Boring, Facing and Internal Threading Tools. Write for Data.

Bore Small Holes? Contact COMET

Comet® LOW COST STEP DRILLS

HIGH SPEED STEEL
Made to Your Own Specifications
PROMPT SERVICE

Write for Complete Data

COMET Tool Co.
738-TI Broadway, New York 3, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1332

NEW HOLOMATIC DRILL UNITS

with 4" – 6" or 10 INCH STROKE CAPACITY

To meet your ever increasing production tempo, Hause has developed two new drill units with 6" and 10" stroke capacities. As was the original time-proved 4" stroke model, the new Holomatic drill units are completely self-contained reciprocating quill type power devices for use on *production drilling, reaming, centering, facing,* etc. They can be used individually or in groups with manual or full automatic cycling. Units are air actuated, precisely controlled hydraulically. Available with six standard drives, motor horsepowers to 2 H. P., spindles are interchangeable for single or multiple head applications.

- **Concentric construction assures accuracy, longer life**
- **Honed, polished and chromed thrust piston and quill**
- **Up to 3600 four-inch stroke cycles per hour**
- **Automatically filled hydraulic system**
- **Built-in hydraulic oil filter system**
- **Sealed—oversize ball bearings on spindle and shaft**
- **Sealed unit construction *permits mounting in any position***
- **Mounting surfaces on three sides for installation flexibility**

Find out now—why Holomatic drill units are setting the pace in progressive production plants across the nation. Your Hause representative will gladly demonstrate their multiple dollar-saving efficiencies right in your plant.

Write today *... for demonstration or additional information, specifications and prices on the new Holomatic "Air-Hydraulic" Drill units, "Balanced Air" Threading units, "Lead Screw" Tapping units, complete machines or full line of machine bases and accessories.*

Hause MACHINES, INC.
MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1333

New!

ALINA SCROLL CHUCK

A truly high precision chuck developed to meet exacting requirements. The method of clamping the largest possible area of the circumference permits minimum use of pressure; fragile work is never deformed or crushed. In order to maintain this advantage chucks over 4" capacity are equipped with eight jaws.

Removable jaws are available in a wide variety of styles for internal or external chucking, or they may be had in blank form suitable for your own machining.

Simple design permits quick and easy replacement of the shank, and shanks to suit special requirements may be machined at minimum cost in any shop.

Six sizes from 2" to 6" to fit all machines. Furnished with or without shanks.

WRITE FOR LITERATURE AND COMPLETE CATALOG

ALINA CORPORATION

122 East Second St., Mineola, L.I., N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1341

When a Vise becomes a Virtue...

It's a MULTI-PURPOSE VISE

Outstanding Quality • Economy Priced

4 hardened stepped jaws permit clamping of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Rigid in any position.
Various capacities and extra soft jaws available. — Complete repair facilities available — replacement parts in stock.

Model VD/O

Write also for literature and prices on MBI Reversible Tapping Attachments, Keyless Drill Chucks and Dial Vernier Calipers.

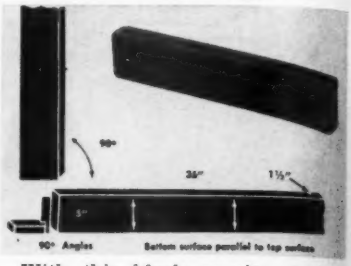
Manufacturers representatives and dealer inquiries invited!

M.B.I. EXPORT AND IMPORT Ltd.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery"

CIRCLE INFORM-A-GRAM KEY NO. 1342

Product News

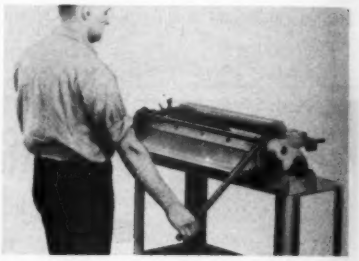
Parallel Straight Edge



With this black granite straight edge with 90° angle side it is possible to check squareness, parallelism, and straightness. The new straight edges comes in three grades for laboratory, inspection, and toolroom use. Catalog CMC-4 is available from Collins Microflat Co., 3249 E. Segundo Blvd., Hawthorne, Calif., or Circle Inform-A-Gram No. P66.

4-to-1 Finger Brake

A new Box Finger press brake with 24" forming width, undercut fingers, and 1" clearance through

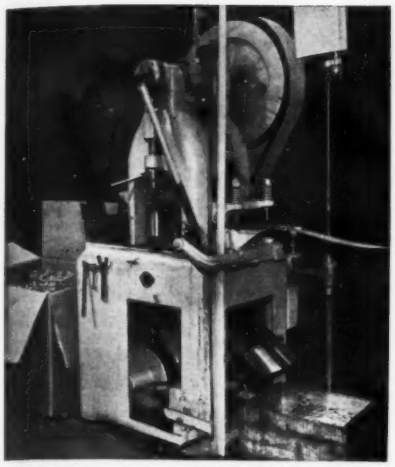


top opening is used in model shops and for short run production. Model 24's maximum bending angle in one operation is 135°. O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., or Circle Inform-A-Gram No. P67.

Safe Hydraulic Fluid

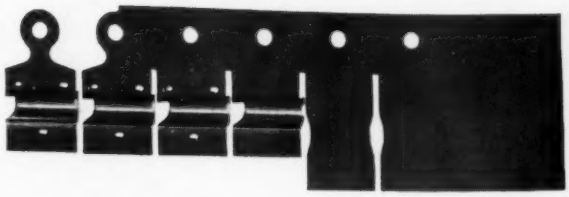
In applications where fire-resistant fluid is necessary at pressures up to 2000 psi and operating temperatures up to 150°F, use Sunsafe hydraulic fluid. It has high viscosity index with excellent film strength and good thermal stability. Sun Oil Co., 1608 Walnut St., Philadelphia 3, or Circle No. P68.

1500% MORE Pieces Per Die Sharpening on DIEBEL with *Exclusive Cylindrical Ram*



NEW METHOD produces 500,000 to 800,000 pieces per die sharpening with very little punch breakage. Production is 42,000 pieces per shift on one 12 Ton DIEBEL Hi-Production Automatic Press and quality of pieces is better. Here is dramatic proof that DIEBEL'S exclusive cylindrical ram cuts die deflection to an absolute minimum.

5 Station die produces 500,000 to 800,000 calendar pencil clips per grind from .008" stock at Brown & Bigelow plant in Minneapolis.



WHEN THIS PART was moved from an O.B.I. to a DIEBEL 12 Ton Hi-Production Automatic, production increased from 50,000 to as high as 800,000 pieces per grind with less punch breakage.

OLD METHOD required three dies that had to be sharpened every 50,000 pieces. Punch breakage was high. It took two O.B.I. presses working two shifts to produce 25,000 pieces per day.

Sales Service Mfg. Co.

2361 University Avenue **St. Paul 14c, Minnesota**

CIRCLE INFORM-A-GRAM KEY NO. 1351

Mahr **INDICATING MICROMETER and COMPARATOR** With the VISIBLE FEEL

WILL DETECT OUT-OF-ROUNDNESS — OVALNESS — TAPERED CONDITION IN 1/10,000" — 0-1" Range

TENTHS VERNIER

LARGER SIZES UP TO 12" AVAILABLE

ONLY $99.50 IN HARDWOOD CASE

Cat. #40 SF

3 TOOLS IN ONE COMPARATOR
Master MICROMETER
"GO" & "NO GO" GAGE - 1" Range in .0001"

A RIGHT HAND TOOL Release Button for Movable anvil on right hand side enables operator to hold tool the conventional way.

NEW! Resetting to Zero in Seconds. Quick Adjustable Tolerance Hands. HEAVY TUNGSTEN CARBIDE tipped Measuring Anvils. STAINLESS STEEL, one-piece spindle and screw, hardened with Ground Threads — Permanently Rustproof.

GUARANTEED Mahr QUALITY

INDICATING BENCH MICROMETER with NON-ROTATING Spindle

ONLY $170.00 IN HARDWOOD CASE

Range 0-1" Cat. #40 MSF

Reading .000050" from dial. Directly reading in .0001" from micrometer. 1-3/4" thimble dia. Dull chrome finished.

Here is a SUPER PRECISION MEASURING MACHINE for the measuring of small and delicate parts for Tool and Instrument making.

USE IT AS A COMPARATOR

Anvils RETRACTABLE for rapid repeat measurements. Adjustable Tolerance Hands. Instant Zero adjustment of indicator.

20 MILLIONTHS INDICATOR READING AVAILABLE

FEATURING . . . Adjustable Measuring Pressure to any desired tension. Non-rotating Spindle assuring absolute parallelism of anvils.

Eleven Types of INTERCHANGEABLE Measuring Anvils available.

IF NOT AVAILABLE AT YOUR FAVORITE SUPPLY HOUSE — WRITE TO US FOR ILLUSTRATED FOLDER.

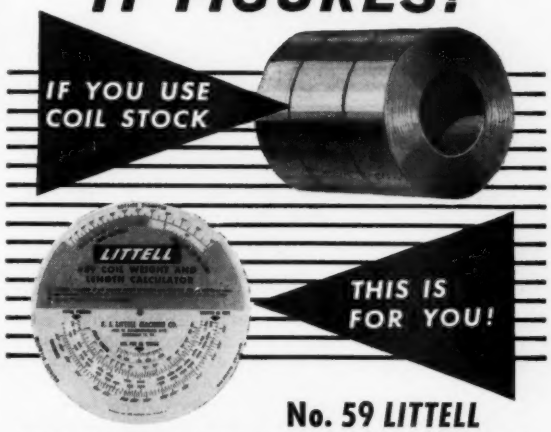
MAHR GAGE CO., INC.

HEADQUARTERS FOR PRECISION MEASURING INSTRUMENTS AND FINE TOOLS

274-TO Lafayette St., New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1352

IT FIGURES!



No. 59 *LITTELL*

COIL WEIGHT AND LENGTH CALCULATOR

It's FREE. It figures accurately. Just set it for the I.D., O.D., Width and Thickness of your coil and it instantly tells you the coil's weight and length. Designed for steel coils. Usable for other metals. Write for your calculator *now*.

F. J. LITTELL MACHINE CO.

SERVING USERS OF COIL STOCK

Branches: Detroit Cleveland

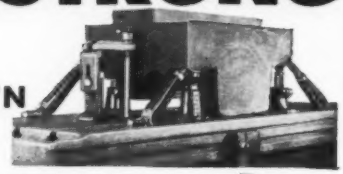
Ask for a catalog, too!

4197 N. RAVENSWOOD AVE., CHICAGO 13, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1353

ARMSTRONG

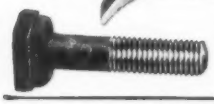
SET-UP and HOLD-DOWN TOOLS



ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

Write for circular

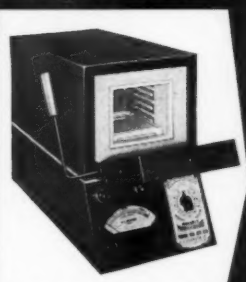


ARMSTRONG BROS. TOOL CO.

5220 W. Armstrong Ave., Chicago 46, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1361

Designed for Small Parts Treating...



HUPPERT DeLuxe ELECTRIC FURNACES

• Here's a series of compact durable furnaces that are ideal for tool and die shops and small laboratories. Any desired temperature within the range of 300° to 1900°F. is controlled by an accurate, built-in Huppert Temperature Controller. All-steel construction — multi-insulation — sturdy Kanthal elements — counterweighted doors — removable porcelain tray.

Write today for literature on complete line of Huppert Furnaces and Ovens in floor and bench models. Ask for "Hints on Heat Treating."

Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4¼"	3⅝"	4¾"	300°–1600° F.	920	$ 90.00
439DL	4¼"	3⅝"	9"	300°–1600° F.	1650	120.00
436DL	4⅝"	3¾"	6"	300°–1900° F.	1650	130.00
5DL	4⅝"	3¾"	9"	300°–1900° F.	1750	176.00
9DL	6"	6"	6"	300°–1900° F.	2200	200.00
669DL	6"	6"	9"	300°–1900° F.	3000	248.00
10DL	8"	4"	6"	300°–1900° F.	2000	220.00
849DL	8"	4"	9"	300°–1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost. Stainless steel housing slightly higher.

K. H. HUPPERT CO.

Manufacturers of Electric Furnaces and Ovens

6820 Cottage Grove Ave., Chicago 37, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1362

You Need an Extra Hand Now to Speed Up Production!

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

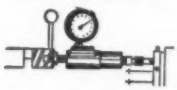
HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1363

Screws Into Stop Rod



NEW STOP GAGE

FOR TURRET LATHES

Holds Tolerances to .0005"

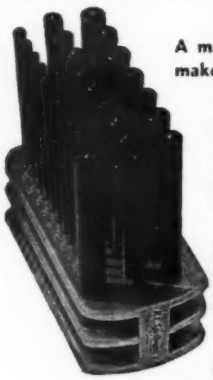
New patented Ladco Stop Gage is easily installed—saves time and trouble in set up! Cuts rejects! Accurately positions longitudinally, tooling mounted on cross slide. Ladco Stop Gage available with Waterproof Indicator and also with .0001" Indicator.

LAD GAGE COMPANY

BOX "A" GEAUGA LAKE, OHIO

Write for FREE BULLETIN and Prices

CIRCLE INFORM-A-GRAM KEY NO. 1364



SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1365

LEAD HAMMERS—Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

COOK'S LEAD HAMMER SERVICE

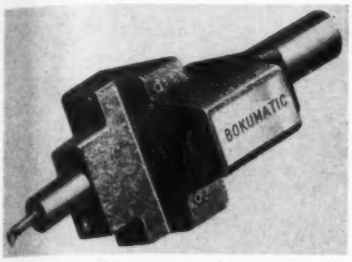
68 Massasoit Ave., E. Providence 14, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 1366

The Inform-A-Gram card which follows page 66 is for your convenience in making inquiries about advertised Products and Editorial items.

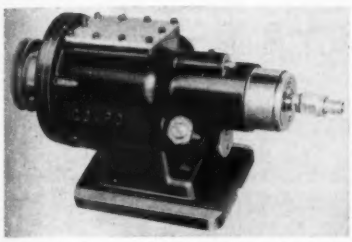
Product News

Fast Internal Cuts



Metalworking operations requiring internal grooving, back chamfering, thread recessing, or special internal forming are simplified and speeded up with a new series of holders for internal cutting tools. Data on Bokumatic RT Series available from Bokum Tool Co., 14755 Wildemere Ave., Detroit 38, or Circle Inform-A-Gram No. P69.

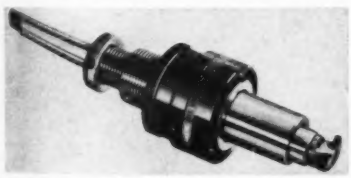
Low-Cost Drill Unit



Infinitely variable hydraulic rate of feed control with adjustable rapid approach to control the tool at entry and at break-through are features of the KHB automatic drilling unit. It has its own built-in feed so shop air isn't needed. Govro-Nelson Co., 1931 Antoinette Ave., Detroit 8, or Circle Inform-A-Gram No. P70.

Automatic Recessing Tools

Interchangeable parts to increase work range are a feature of these new automatic feed recessing tools. Used on standard drill presses, radi-



al drills, and special machines, the units eliminate need for complex tooling for intricate jobs like relieving, grooving, and counterboring. Get details from Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, or Circle Inform-A-Gram No. P71.

ALLEN
HEAVY DUTY
PUNCH PRESSES

Powerful
Dependable and Economical
Fully Guaranteed

Hundreds of different Model Combinations 1 to 12 ton Capacities

See your Supply Dealer or write for Catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.

Moderate in Price

Thousands in use the World over

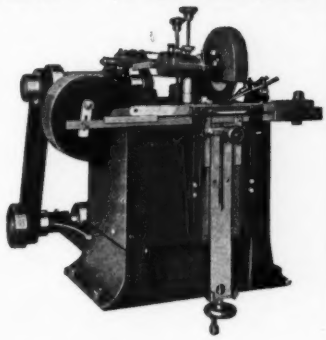
ALVA ALLEN INDUSTRIES, Dept. TP
Clinton, Missouri Tel. TUrner 5-3331

CIRCLE INFORM-A-GRAM KEY NO. 1371

For Only a Few Pennies

You can sharpen a gross of Hack Saw Blades with Wardwell's "EC" Combination Grinder. When you have done this only six times you have saved the cost of the machine.

The Wardwell "EC" is the **only** grinder that does not depend upon shape of grinding wheel to form shape of teeth.



WARDWELL
3809 Ridge Road
Cleveland 9, Ohio

For full information about the "EC" Combination, write now.

CIRCLE INFORM-A-GRAM KEY NO. 1372

For most economical threading on all Automatic Screw Machines, Chucking machines, Bolt threaders, Drill presses, etc.

H & G insert chasers

CUT YOUR COSTS AND DOWN TIME

For approximately $50 you get 12 sets of ¾-16 (or any stockable size) Insert Chasers; each set ground ready for business. This dozen sets can thread hundreds of thousands of parts with no down time or sharpening time. Can be thrown away when dull or if you prefer, flash grind the dull sets and make an extra profit. Threads stand critical examination and conform to the close tolerances of Class 3 fits. Send for our digest of the Government publication, "UNIFIED AND AMERICAN SCREW THREADS".

THE EASTERN MACHINE SCREW CORPORATION 29-49 Barclay St., New Haven, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1381

Precision Castings

BERYLLIUM COPPER
ALUMINUM — STEEL
in Pressure Castings
and Shaw Process Castings up to 400 pounds

Years of skilled experience and the most advanced casting techniques are available to give you precision castings in the shortest possible time . . . at costs well within your production budget.

We are constantly doing experimental and development work on precision castings from many of the newest alloys.

Fast Delivery — Top Quality

Write or call for complete information.

STANDARD TOOL COMPANY

216 Hamilton Street, Leominster, Massachusetts

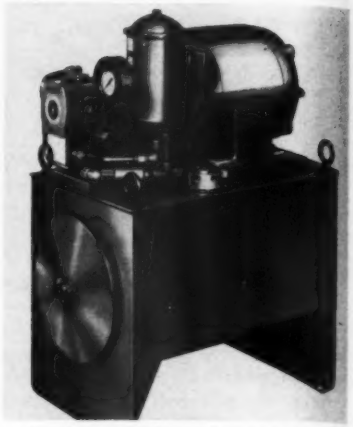
OMNI PRODUCTS CORPORATION—Export Distributors, New York, N.Y.

7

CIRCLE INFORM-A-GRAM KEY NO. 1382

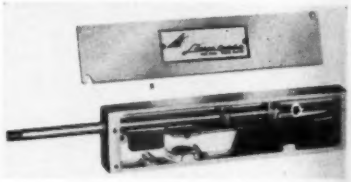
Product News

Hydraulic Power Unit



An inexpensive 10-gal hydraulic power package provides hydraulic power and control for many applications requiring low hydraulic power, such as gaging, transferring, and indexing. Vickers Inc., Detroit 32, Mich., or Circle No. P72.

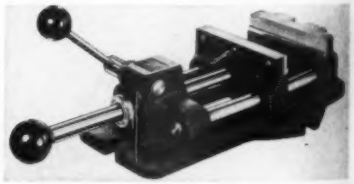
Automation Switches



Cut cost of automatic electrical control of linear machine movements with this new standardized line of packaged electro-mechanical switching units. The units can be mounted quickly on either square cylinders, round cylinders, or machine slides. Get details from Linear Controls Co., 3400 Main, Skokie, Ill., or Circle No. P73.

Drill Press Vises

A new line of precision-built wide-range drill press vises and fixture holders safely handle both rigid



and non-rigid work without distortion. A turn of the front adjusting screw bushing carries the jaw pressure from 1 to 1500 lbs. Available in 4″, 6″ and 8″ sizes. L-W Chuck Co., 72 S. Clair St., Toledo 4, Ohio, or Circle Inform-A-Gram No. P74.

JUST OUT!
NEW 1959 EDITION

free 84-PAGE CATALOG

One Complete Source of Detailed Specifications for Designers, Production Managers, Toolroom Foremen

Hundreds of NEW ITEMS

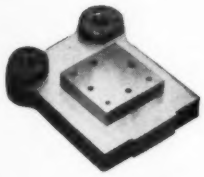
ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application. Write for your FREE copy today.

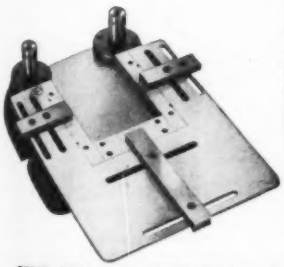
JERGENS TOOL SPECIALTY CO.
Dept. TP-10, 712 E. 163rd St., Cleveland 10, Ohio
CIRCLE INFORM-A-GRAM KEY NO. 1391

Punches and Dies

Notching Die with Gauge Table

MHL





Standard stock sizes 4", 5" and 6". Lick those Notching Problems QUICKLY. Gauge table and gauging bars provide accuracy and speed with easy adjustment.

This is another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Precision made from high grade tool steel. Also adaptors and die shoes to convert your press.

27 *years of serving your punch and die requirements.*

What are your punch and die needs? Consult us about your problems. Prompt service on "Specials" made to your order.

SEND FOR FREE CATALOG No. 157 AF, illustrating our standard punches and dies and complete line of modern sheet metal fabricating equipment. **Net prices shown.**

WARD Machinery Co. 564 West Washington **Chicago 6**

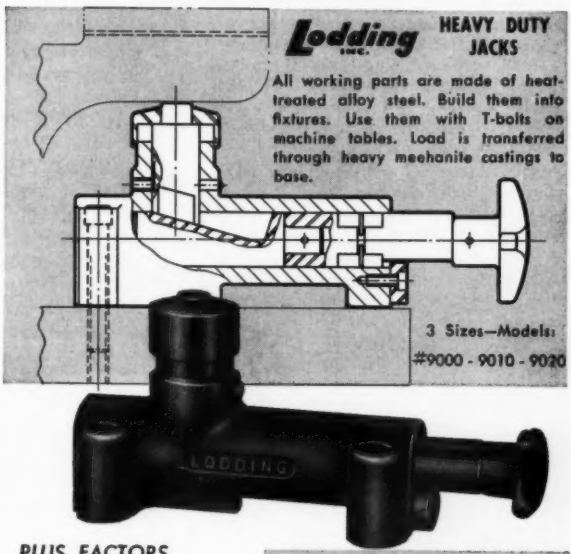
CIRCLE INFORM-A-GRAM KEY NO. 1392

PREFERRED

because it

...SAVES MONEY ...SAVES TIME

The acknowledged leader in its field, LODDING appreciates the recognition and commendation it has received from the nation's outstanding tool engineers.

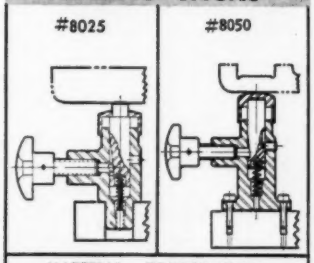

Lodding INC.
HEAVY DUTY JACKS
All working parts are made of heat-treated alloy steel. Build them into fixtures. Use them with T-bolts on machine tables. Load is transferred through heavy meehanite castings to base.
3 Sizes—Models:
#9000 - 9010 - 9020
LODDING

PLUS FACTORS

- ✓ **Longer life**
- ✓ **Greater serviceability**
- ✓ **All moving parts are heat treated and ground**
- ✓ **Forged tool steel material**

TRACING TEMPLATES AVAILABLE
For information write

SPRING JACKS



MATERIAL — FORGED STEEL
4 MODELS AVAILABLE

Lodding INC.
AUBURN, MASSACHUSETTS

FACTORY WAREHOUSES

Goodwin-Snader Co.	Bagby Engineering Co.	Southern Tool Dist. Co.
6814 S. Western Ave.	1047 Forest Ave.	54 11th St. No. East
Los Angeles 47, Calif.	Evanston, Ill.	Atlanta 9, Ga.
PLeasant 3-1553	BRoadway 3-2273	TRinity 5-7065

CIRCLE INFORM-A-GRAM KEY NO. 1393

SELF-CONTAINED SLITTERS

YODER SLITTERS

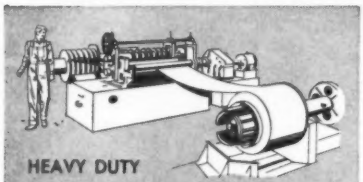
basic equipment for cost-conscious users of strip!

To help meet the demands of tight production schedules, YODER Slitters reduce mill-width stock quickly and economically to desired widths. If your needs are as low as 100 tons per month, time and manpower savings alone will offset the cost of your YODER Slitter in a matter of months, while reducing basic inventories. Compactly designed, standard YODER Slitters are built to handle standard coil widths... completely engineered lines for special requirements.

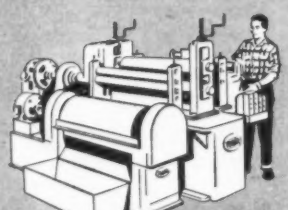
YODER accessories, such as coil cars, swivel unloaders, scrap choppers, scrap disposers, plate levelers and coil boxes, make stock handling fast and easy.

YODER also makes a complete line of Cold Roll-Forming equipment and Pipe and Tube Mills. To profit from YODER'S years of engineering and service experience, contact your local YODER representative or send for the fully illustrated descriptive, YODER Slitter Manual; it's yours for the asking. Write to

THE YODER COMPANY
5501 Walworth Ave. • Cleveland, Ohio



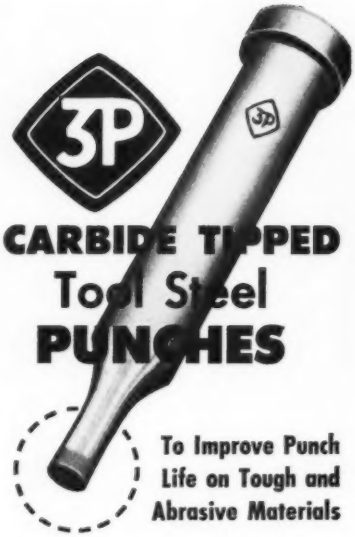
HEAVY DUTY SLITTING LINES



SCRAP CHOPPERS

ENGINEERING YODER MANUFACTURING ROTARY SLITTING LINES

CIRCLE INFORM-A-GRAM KEY NO. 1401



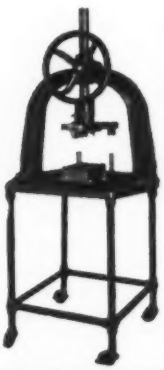
CARBIDE TIPPED Tool Steel PUNCHES

To Improve Punch Life on Tough and Abrasive Materials

In an exclusive process, Porter Precision Products WELDS Tungsten Carbide to tool steel. These punches are made to approved ASTE Standards. PORTER GUARANTEES THE STRENGTH OF THE WELD TO EQUAL THE STRENGTH OF CARBIDE ITSELF. The carbide will not come off.
3P Carbide Tipped Punches give longer wear life; can be used in your present steel dies. Available from stock—immediate delivery. Write for 3P Catalogue No. 200.

Porter Precision Products
P. O. BOX 208
CINCINNATI 15, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1402



COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

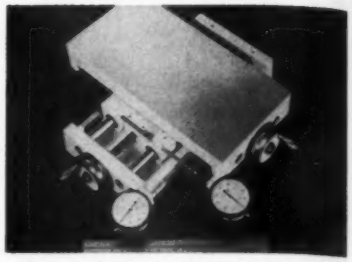
Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the die-maker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

Sole Distributors
MOORE SPECIAL TOOL CO., INC.
726 Union Avenue Bridgeport 7, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1403

Product News

Adjustable Work-holding



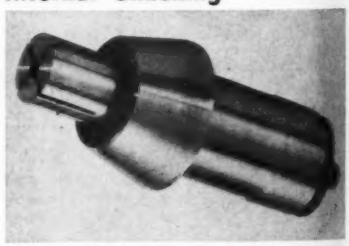
Inaccuracies in slide tolerance and backlash in screws and nuts are eliminated with these new two-way adjusting compounds for precision holding and locating of workpieces. Dial indicators and adjusting rods, mounted on the new compound, compensate for backlash and allow adjustments to 0.0001" tolerances. Tracer Control Co., 595 E. 10-Mile Rd., Hazel Park, Mich., or Circle No. P75.

Small Filter Unit

Prevent damage from sludge, rust, and dust using Model 1117-2 filter on small air-operated instruments,

checking gages, and miniature valves to filter compressed air. Its small size permits attaching it directly to their air inports. Wilkerson Corp., 1640 W. Girard, Englewood, Colo., or Circle Inform-A-Gram No. P76.

Internal Chucking



This expanding collet for turret lathes has a new push-type design for ¾" to 6" dia internal chucking. Soft expanding mandrels, available in 1", 1½", 2", and 2½" dia and 1½" or 2" long, are easily machined to required size or shape for accurate concentricity. The Dunham Tool Co., Inc., Route 4, Danbury, Conn., or Circle No. P77.

ANNOUNCING

The new **CRATEX**

TOOL & DIE MAKERS KIT

The world's finest rubberized abrasives for deburring, smoothing and polishing tools, dies, patterns, molds, models, instruments and component parts.

Kit contains 80 wheels and points in the most popular sizes and shapes, equally assorted in four grit textures, coarse (C), medium (M), fine (F), extra fine (XF)... plus four mandrels for ⅛" chuck... packaged in plastic box, compartmented for fast selection. $7.50 complete.

Order your new Cratex Tool & Die Makers Kit #777 through your distributor—or, send your order to us for delivery by the Cratex distributor nearest you.

CRATEX *Free 8-page catalog available on request.*

MANUFACTURING CO., INC.

1600 ROLLINS ROAD, BURLINGAME, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 1411

AIR-MITE

HIGH PRODUCTION AIR PRESS *with more Quality Features*

★ **Solid Steel Column. Greater strength and rigidity.**

★ **Brass cylinder, aluminum end castings, Hy-Car piston cups.**

★ **Accurately ground table.**

★ **Fast set-up and stroke adjustment.**

You don't have to "baby" an AIR-MITE Press because they're ruggedly built to stand the gaff of production work. From the tip of their solid steel column to the heavy base, they're every inch a workhorse tool. Feature-for-feature, you can't buy a better, more economical operating press than an AIR-MITE.

Special adaptations available. Write us your needs.

1 Ton Capacity

$89.95

F. O. B. Chicago

New 3 Way Control Valve. For safer, more efficient press work, use AIR-MITE Control Valves. Connected in parallel and positioned on either side of an air press, they provide a safe, instantaneous press operating control. Operator must depress both handles to actuate press . . . keeps attention on work-piece, hands out of the way. For pressures up to 160 p.s.i.

AIR-MITE Devices, Inc.

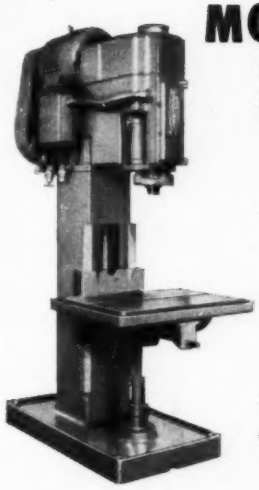
4405A W. KINZIE • CHICAGO, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1412

FOR HIGH SPEED PRECISION TAPPING *CHOOSE THE*

KAUFMAN

MODEL 10E-20



Check these six features of this new, precision-built Kaufman Tapping Machine:

1. Lead screw control for accurate threads and maximum tool life. Maximum 4½" lead screw travel.
2. Rapid approach of spindles to work.
3. Clutch operated for faster operation — Reversing spindles at twice forward speed.
4. Six speed transmission providing spindle speeds of 80-350 RPM with 3-1 ratio or 160-700 with 1½-1 ratio clutch.
5. Units provided with 5-7½-10 H.P. motors.
6. Speeds and H.P. available for highly efficient tapping from 5/16" through 2" NC taps or smaller taps with use of multiple head.

For additional information about the new Model 10E-20 or other Kaufman machines for single or multiple operation, write or telephone:

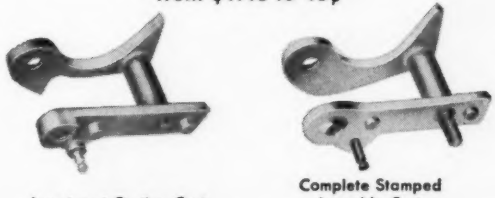
KAUFMAN MFG. CO.

529 S. 29th Street. Manitowoc, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 1413

SWITCH FROM INVESTMENT CASTING TO STAMPED ASSEMBLY SAVES 71%

Short-Run Blanking Dies Cut Unit Cost from $1.48 to 43¢



Investment Casting Cost:
$1.48 EACH IN 1000 LOTS

Complete Stamped Assembly Cost:
43¢ EACH IN 1000 LOTS

An investment casting was formerly used involving additional machining operations. Converting to a brass stamped assembly gave the customer a more accurate, physically superior part at a 71% saving.

Consider D-R Stampings for your products. Send sketch, blueprint or part, plus quantity, for prompt quotation.

DAYTON ROGERS *Manufacturing Company*

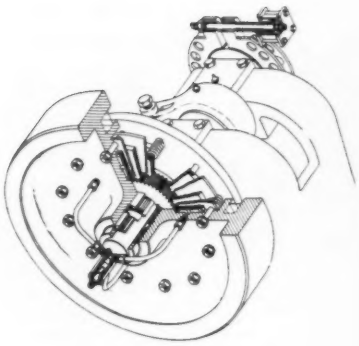
MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 1414

Product News

Fast Acting Clutch

A new air-operated, electrically-controlled air clutch and brake, featuring fast action, smooth operation, and economy, allows press speeds to be increased without damage or shortened life. Shockless, instant starting and stopping are obtained with low air consumption. Service Machine Co., 2310 W. 78th St., Chicago 20, or Circle No. P78.



HOW TO BEND bars and tubing
1 OFF CENTER EYES
Insert bar stock between Locking Pin and Radius Pin of desired size.
Clamp tube. Insert Follow Block between material and Forming Roller.
TUBING 1
2
Set Forming Roller against material and advance Operating Arm.
Advance Operating Arm until it strikes Angle Stop. 2
3
Complete operation with one steady movement.
Remove Follow Block, release clamp and remove tube.
3

with a DI-ACRO BENDER

Complete details on forming rods and tubing with standard accessories as well as tips and technical data on angle, channel and other materials will be found in "It's easy to bend", a 32 page summary of Di-Acro Benders and bending. A copy is yours free of charge.

pronounced die-ack-ro

di-acro PRECISION METALWORKING MACHINES

Consult the yellow pages of your phone book under Machinery—Machine Tools for the name of your Di-Acro distributor or write:

O'NEIL-IRWIN MFG. CO.

315 8th Avenue Lake City, Minn.

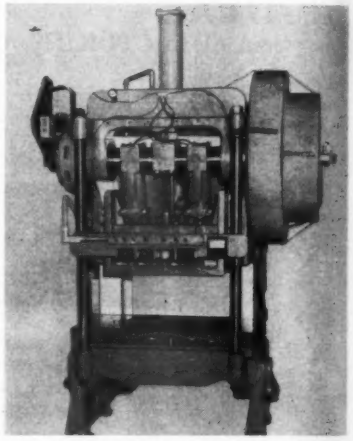
Find Us Fast in the Yellow Pages

CIRCLE INFORM-A-GRAM KEY NO. 142

Three Mikemasters

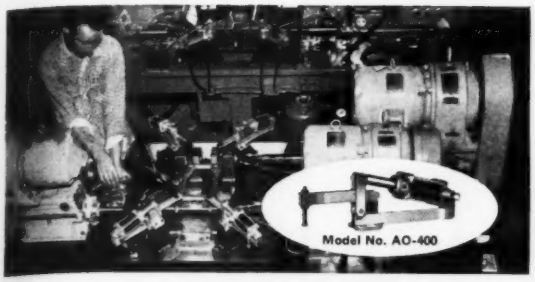
Assure accuracy of micrometers and other OD measuring tools by using this Mikemaster checking gage announced by Size Control Co., 2500 W. Washington Blvd., Chicago 12. Models M-1, M-1½, and M-2 have ½" to 6½" range. Get details from company, or Circle No. P79.

60-Ton Flywheel Press



Fast operating speeds are possible on this new line of 60-ton flywheel presses equipped with Wichita air clutch and spring-applied air release brake. The presses are ruggedly constructed with round bronze main bearings, inline front tie rods with spacers, and coupled ram adjustment. Get details from Perkins Machine Co., Warren, Mass., or Circle Inform-A-Gram No. P80.

Recent price reductions on Carmet mining tools have been announced by Carmet Division of Allegheny Ludlum Steel Corp. in a new price list. For drill bits, you'll find a 20% reduction on 500 quantities and 25% on 1500 quantities. Other savings are included in the new list available from Carmet Div'n, Allegheny Ludlum Steel Corp., 1500 Jarvis St., Detroit 20, or Circle No. P81.



IF PARTS MUST BE HELD
LET KNU-VISE CLAMPS SUPPLY THE MUSCLES

Machining, welding, assembly—wherever parts must be securely held during a manufacturing process—that's where you'll find a lion's share of the work being done by versatile, air-operated Knu-Vise clamps.

Typical of the countless clamping applications handled so successfully throughout American industry by Knu-Vise clamps is the operation illustrated above—the holding of air frame components during drilling operations. These special machines were designed and built by Hewitt and Faust Mfg. Co., El Cajon, California.

If your company has a metal holding application that demands accurate, positive clamping you'll find Lapeer Mfg. Company has a Knu-Vise clamp that will meet your exact needs. Knu-Vise clamps are available in manual, air and oil operated models—are manufactured to give maintenance-free service year-in-and-year-out under the toughest operating conditions.

WRITE TODAY TO DEPT. D FOR COMPLETE INFORMATION

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

3064 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: ART LEWIS PRODUCTION EQUIP. CO.
419 Magnolia Street, Glendale, California

CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD.
1131 Pettit Road, Burlington, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 1431

NOW-

Carr-Lane has opened the gateway to

STAINLESS STEEL COMPONENTS

Non-Magnetic, Non-Corrosive Jig and fixture components. Use them for weld fixtures to save time and money on these difficult parts. All are the usual Carr-Lane quality and precision made.

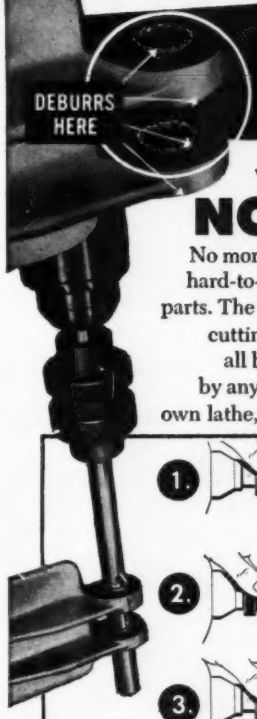
Investigate Now!

Send for new catalog

Carr Lane MANUFACTURING CO.
4200 Krause Court • St. Louis 19, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 1432

How to... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION

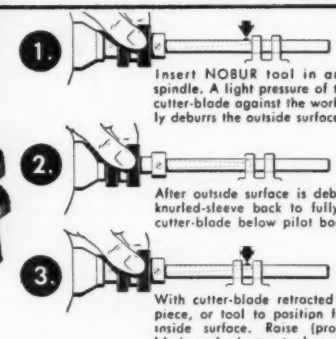


★ faster
★ better
★ easier

with the amazing

NOBUR TOOL

No more hand-finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds . . . all by *machine operation*. Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.



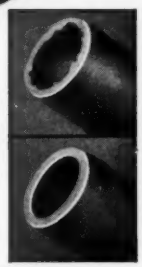
1. Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter-blade against the workpiece quickly deburrs the outside surface.

2. After outside surface is deburred, slide, knurled-sleeve back to fully retract the cutter-blade below pilot body diameter.

3. With cutter-blade retracted move workpiece, or tool to position for deburring inside surface. Raise (project) cutter-blade and advance tool or work piece to deburr first one surface then the other.

NOBURSINK...

a new approach to chatterless **DEBURRING and CHAMFERING**

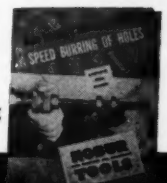


Now . . . deburr openly accessible hole faces faster and easier than ever before. Low torque design permits rapid, offhand workpiece handling without chatter — even on large diameters. May be reground without special tools. Works on all metals, plastics, etc. Each tool accommodates a wide range of work sizes.

FOR FULL DETAILS

Write for FREE Folder

Send for all the details on Nobur Tool Products — the key to *lower* costs, *higher* production and *improved* quality on your deburring operations. WRITE TODAY!



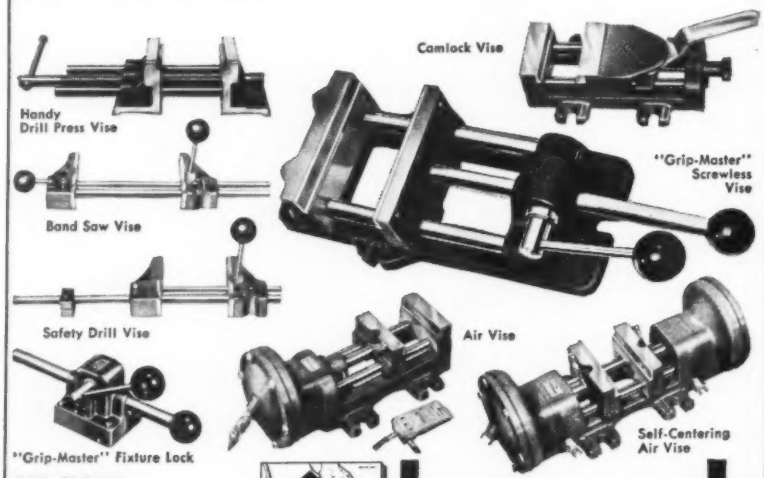
NO/BUR TOOLS **NOBUR MANUFACTURING CO.**
6860 Fairdale Ave., No. Hollywood, California

CIRCLE INFORM-A-GRAM KEY NO. 1433

SPEED PRODUCTION with . . .

heinrich

holding devices for rapid-fire production



SEE YOUR INDUSTRIAL DISTRIBUTOR
for details on the complete line of Heinrich Tools or write for free catalog.

heinrich
QUALITY TOOLS

HEINRICH TOOLS, INC., Dept. 139-J, Industrial Drive, Racine, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1441

DYKEM STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.
DYKEM STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
Without DYKEM Steel Blue

CIRCLE INFORM-A-GRAM KEY NO. 1442

CONTRACT SERVICES DIRECTORY

Listings, $12.00 per inch ($1.50 per ⅛ inch) Minimum charge, $4.50 per insertion. Rates net.

Illinois

DRESEL-BETZ CO.
Belleville, Ill.
Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

Michigan

DAVIS TOOL and ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery, Sheet Metal Stampings and Assemblies.

New Jersey

TEMJAY TOOL & MACHINE CO.
236 South Street, Newark, N. J.
MI 3-0891 — RE 1-7860
Designers & Builders
Tools, Dies, Jigs, Fixtures, Molds and Special Machines

Ohio

BUCKEYE INCUBATOR CO.
329 Mt. Vernon Ave., Springfield, Ohio
FA 5-9222—Ext. 263
Production Facilities for Metal Stampings, also Woodworking, Machining, Welding, Painting and Assembly. Tooling & Production at Reasonable Prices.
Large or Small Parts
Long or Short Runs.

CLEVELAND UNIVERSAL JIG COMPANY
13404 St. Clair Ave. Cleveland, Ohio
MU 1-2600
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Rousing and Tooling

Wire Forms: Racks, Wire Assemblies:
Made to Specifications
LOW PRICES: WRITE
Fasform Wire Division
6125 Carnegie Ave., Cleveland 3, Ohio

GENERAL DIE & TOOL CO.
2067 W. 55th St., Cleveland, Ohio
WO 1-4736
Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery Manufacturing.

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, Ohio.
Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, BEdford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

WILLEY'S Pentagon

UNCONDITIONALLY GUARANTEED

to out-perform any other style of carbide throw-away insert—for straight turning, boring, or facing applications—on any kind of material.

solid carbide

indexable insert

The pentagon is a cam ground, radii tangent, indexable insert of solid carbide. It presents **10 cutting edges** at a 30° lead angle and each edge will produce more finished work than the edge of any other standard insert.

Not on tests alone—but in actual production; on various operations; machining all types of materials—Willey's Pentagon more than doubled the best performance of all other inserts tried. It is proven superior . . . **we guarantee it.**

Try the pentagon! You'll save money. You'll do a better job—faster, and once used you'll never go back to fragile . . . high-cost . . . yesterday's tooling.

A complete catalog of Willey's carbide tool products is available on request.

Send your part print and present tool layout for prompt quotation

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor highway • Detroit 1, Michigan • Telephone: WOodward 1-9444

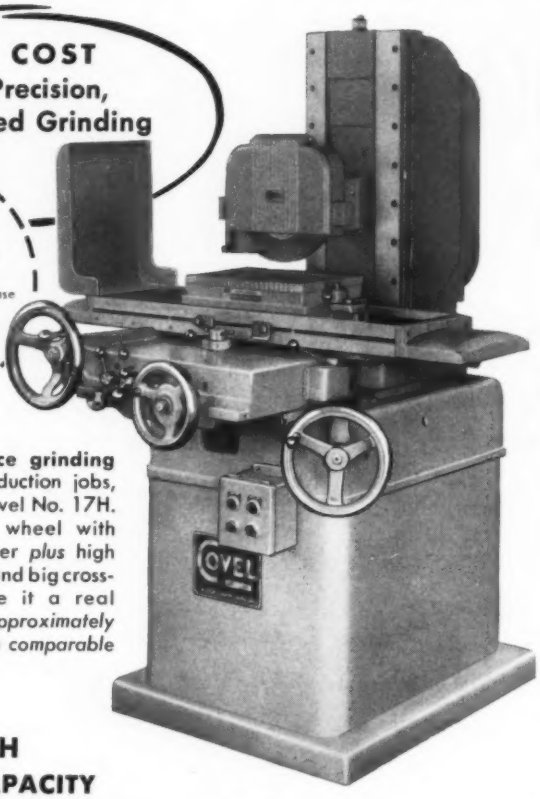
CIRCLE INFORM-A-GRAM KEY NO. 145

NOW! for the FIRST time HYDRAULIC FEED on a 10" x 16" grinder

LOW COST Micro-Precision, High Speed Grinding

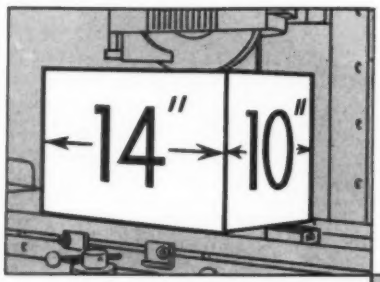
No. 17H Priced at only $3285.00

to give you the operating ease and high speed of hydraulic feed for little more than the cost of a hand feed grinder.



For precision surface grinding on tool room or production jobs, you can't beat the Covel No. 17H. The large grinding wheel with plenty of direct power *plus* high speed hydraulic feed and big cross-feed capacity make it a real money saver. *Grinds approximately twice as fast as with a comparable hand feed machine.*

FULL 10 INCH CROSS-FEED CAPACITY



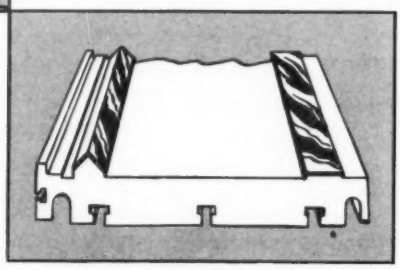
The full 10" cross-feed capacity of the Covel No. 17-H puts it in a class by itself among surface grinders in its price range. You get the extra working capacity you need for bigger jobs without paying a big premium in price!

HARDENED AND GROUND LEAD SCREWS have precision ground threads for smooth, accurate transverse and vertical feed.

PRECISION QUILL TYPE SPINDLE is grease lubricated and sealed for life. 2 HP, 1750 RPM direct drive motor.

FIRST WITH HARD CHROME TABLE WAYS

Available at extra cost for super long-lived accuracy. Hard chrome is applied direct to V and Flat table ways after hand scraping to master plate, preserving original built-in accuracy.



Micro-Precision a Covel Tradition-Since 1874

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

Write, wire or call us TODAY We'll gladly show you what the Covel 17H can do for you. Ask for Bulletin T-109.

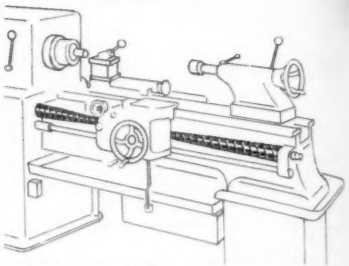
CIRCLE INFORM-A-GRAM KEY NO. 146

Product News

Air Line Filter

Install a Bendix Micropleat filter to remove dirt, water, and oil from factory air lines. No. 571000 is used especially for precision air gage applications and consists of an aluminum filter head that houses inlet and outlet ports. Bendix Filter Div'n, Bendix Aviation Corp., 434 W. 12-Mile Rd., Madison Heights, Mich., or Circle Inform-A-Gram No. P82.

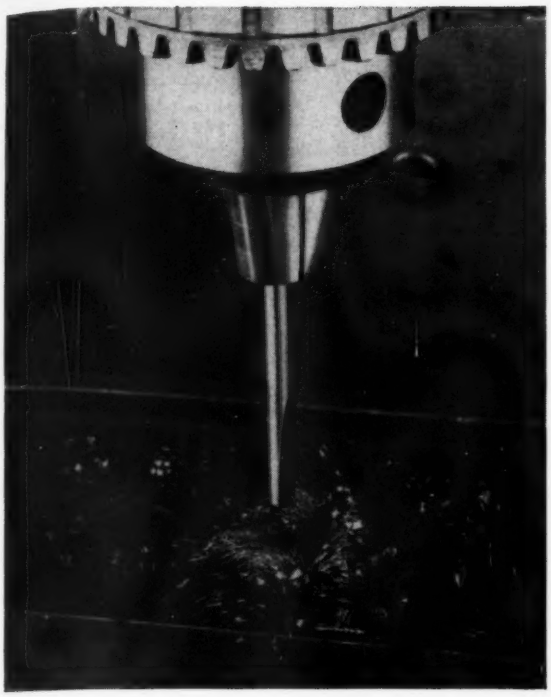
Dust Protectors



Guard precision moving parts from dirt, grime, chips, and welding spatter with these new formed metal dust covers. They permit movement in all directions from within and are self-aligning and self-cleaning. Get details from Central Safety Equipment Co., 6601 Marsden St., Philadelphia 35, or Circle No. P83.

2000-lb Positioner

For quick, precise positioning of heavy odd-shaped work for welding or fabrication, use the PM-1051 work positioner that handles titanium and other superalloys. Its 32" table rotates a full 360° in either direction. Boesch Mfg. Co., Inc., Danbury, Conn., or Circle No. P84.



ELIMINATE COSTLY ANNEALING AND DISTORTION IN HARDENED STEEL WITH FORD HI-ROC CARBIDE DRILLS

Cutting fast in 65 R.C. hardened steel, at ½" to 2" per minute feed, this solid carbide Hi-Roc drill reduces time and risk in salvage of hardened steel parts. In another application, modification of injection and compression molds is easy and quick, and there is no annealing around hole edges.

The job engineered drill point and Ford flute form minimize friction by cutting chips. Actual tests have proved that up to 100 holes were drilled in hardened steel before the Hi-Roc showed signs of dulling.

For salvage and production drilling, Hi-Roc drills produce accurate sized holes within .0002 of drill size . . . and Hi-Roc drills *last*.

Available through all FORD Industrial Distributors.

Rotary FORD Tools

Write for bulletin 806 — Address Dept. TP-959

M. A. FORD MFG. CO., INC.

1545 Rockingham Rd., Davenport, Iowa

Precision Manufacturer of

H.S.S. and Carbide Rotary Cutters • Carbide End Mills • Special Tools

CIRCLE INFORM-A-GRAM KEY NO. 1471

Say good-bye to Guesswork Gaging!

HAND 'EM COMTORPLUG!

precision gage for holes ⅛" to 10" diameter

HERE'S WHO USES IT:

Aireserch Mfg. Co	Hamilton Standard Division
Allison Div	Harris Seybold Co
Buick Motor Div	Homelite Corp
Century Electric Co	Int Harvester Co
Chicago Pneu Tool	Jacobs Mfg. Co
Chrysler Corp	Lycoming Spencer Div
Continental Motors	McDonnell Aircraft
Curtiss Wright	National Lead
Dana Corporation	Northrop Aircraft
Detroit Transmissions	Pontiac Motor Div
Douglas Aircraft	Scintilla Magneto
Fairchild Engine & Airplane Co	Steel Products Eng
Falk Corp	Studebaker Packard
Ford Motor Co	Sylvania (Atomic Div)
General Electric Co	United Airlines
Warner Gear Div	

Large graduations easily read within .0001"

HERE'S WHAT IT DOES:

Shows exact hole size within .0001"

Detects front or back taper, ovality, bell mouth, barrel shape

A fixed — not passing — reading

Automatic features assure uniform gaging, free of user influence

Genuine 2 point gaging, automatically aligned and centered

Used at machine, on work still in chuck, on floor, at bench

Free from wires, air hose, electronic gear.

REASONABLY PRICED

SEND FOR BULLETIN 50 →

COMTOR COMPANY, 82 Farwell St., Waltham 54, Mass.

COMTORPLUG

CIRCLE INFORM-A-GRAM KEY NO. 1472

THE MOST USEFUL TOOL IN YOUR SHOP!

ECONOMY ELEVATING TABLE

• DIE HANDLER • CONSTANT HEIGHT TABLE
• LOAD LEVELER • PORTABLE WORK TABLE

Dimensions.....24" x 36" Lift.....24" min. to 42" max.

Capacity .....2000 lbs. Price: F.O.B. Chicago $245.00

Free 10 day trial in your plant with return privilege

Positive Performance

Self-locking Acme screws hold load safely, securely, at any height. Roller bearing wheels.

Compact Design

No projecting parts — all four sides accessible; crank studs at both ends; three table surfaces.

ECONOMY ENGINEERING

4509 W. Lake St.

Chicago 24, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1473

CUMULATIVE EDITORIAL INDEX FOR 1959 ISSUES

TOOLING & PRODUCTION Magazine

SUBJECT INDEX

Air Power
Air cylinders, integral construction, advantages of, Jan. p. 51 (3 pp)
Timing and sequencing of cylinders, June, p. 49 (3 pp)

Assembly
Automatic parts feeding for, March, p. 47 (3 pp)
Brazing, with automatic equipment, Aug., p. 46 (1.33 pp)
Joining missile tube assemblies by brazing, Sept., p. 60 (3 pp)
Welding, to tight specs, Aug., p. 49 (2 pp)

Automation
Assembly and testing, Aug., p. 46 (1.33 pp)
Controls for automated line, June, p. 55 (1 p)
Effective benefits of, Apr. p. 37 (2 pp)
Grinding, of universal crosses, Aug., p. 72 (1.5 pp)
Small lot shop, for, Jan. p. 39 (1½ pp)

Bending
Draw bending missile tubes, Sept., p. 60 (3 pp)
Economical fixtures for, June, p. 47 (2 pp)

Carbide
Choosing the lubricant for, June, p. 62 (1 p)
Grinding clinic, electrolytic, July, p. 60 (1.83 pp)
Spindle, construction of, Feb. p. 124 (1.6 pp)
Tool housekeeping, Feb. p. 45 (2.65 pp)
Tools, electrolytic grinding of, Feb. p. 42 (1.39 pp)
Tools, electrolytic grinding of, Feb. p. 43 (1.61 pp)
Tools, evaluation of, Feb. p. 37 (4.5 pp)

Castings
Malleable iron, advantages and design of, Apr., p. 44 (2.51 pp)
Miniature investment, process for, June, p. 66 (1 p)

Chucking
Electrostatic, Apr., p. 40 (.61 p)

Clamping
Air, on profiling machine, March, p. 66 (.6 p)

Control
Automatic machines, chart for timing and sequencing components of, June, p. 49 (3 pp)
Automatic, for transfer line, June, p. 55 (1 p)
Electronic tracer drive cuts machining time, Feb. p. 51 (2 pp)
Magnetic tape, die sinking costs reduced by, Jan. p. 58 (1 p)
Numerical, in industry, July, p. 9 (1.5 pp)
Tape, automatic welding by, Jan. p. 54 (1 p)
Tape, for small lot shop automation, Jan. p. 39 (1½ pp)
Tape, with tool changing, March, p. 50 (1 p)

Cost Cutting
Drilling operations combined for, Apr., p. 49 (1.91 pp)
Effective automation for, Apr., p. 37 (2 pp)
Steel rule dies, for, March, p. 65 (1.4 pp)
Tool grinding, electrolytic vs conventional, by, Feb. p. 42 (1.39 pp)
Welded pole pieces redesigned for, June, p. 59 (2 pp)

Cutting Tools
Carbide, choice of lubricant for, June, p. 62 (1 p)
Carbide, electrolytic grinding of, at Thompson Ramo Wooldridge, Feb. p. 42 (1.39 pp)
Carbide, electrolytic grinding of, at Timken Roller Bearing, Feb. p. 43 (1.61 pp)
Carbide, tool housekeeping, Feb. p. 45 (2.65 pp)
Evaluation of, Feb. p. 37 (4.5 pp)

Cylinders
Air, integral construction, advantages of, Jan. p. 51 (3 pp)
Timing and sequencing of, graphic design method for, June, p. 49 (3 pp)

Diamonds
X-ray orientation of, Apr., p. 56 (2 pp)

Dies
Mechanized unloading of, Feb. p 49 (2 pp)
"Shimmy," for shell trimming, June, p. 45 (2 pp)
Steel rule, building of, March, p. 65 (1.4 pp)

Drilling
Ganged drill presses cut costs, Apr., p. 49 (1.91 pp)
Gun, of plastics, Sept., p. 66 (2.49 pp)
Gun, requirements for general purpose, July, p. 54 (2.75 pp)
New production techniques, Feb. p. 55 (4 pp)

Economics, Industrial
Cost of a man-hour, Sept., p. 51 (2.5 pp)
Depreciation an element in investment decisions, Feb. p. 11 (2.5 pp)
Equipment leasing, Sept., p. 51 (1.6 pp)
Foreign competition, Aug., p. 33 (1 p)
Foreign trade, effect of European Common Market on, June, p. 21 (.85 pp)
Inflation, competition, and depreciation, Aug., p. 7 (1.16 pp)
Machine replacement form, Sept., p. 78 (.7 p)
Modernization and expansion, Sept., p. 49 (2.4 pp)
Nomographs for determining lot size, Sept., p 53 (3 pp)
Obsolescence factors, Sept., p. 47 (2 pp)
Tax saving techniques, Sept., p. 44 (2.85 pp)
Value analysis, Sept., p. 39 (1.7 pp)

Fixturing
Aluminum tooling plate, with, June, p. 58 (1 p)
Ceramic for high temp tooling, June, p. 43 (2 pp)
Economical, for bending, June, p. 47 (2 pp)
Low cost for power saws, Apr., p. 41 (2.66 pp)
Vacuum, for thin castings, Apr., p. 47 (1 p)

Forming
Explosive, status of, May, p. 67 (.86 pp)
Hot, of steel plate, Aug., p. 54 (3 pp)

Furnaces
Heat treating, guide to manufacturers of, June, p. 52 (2.8 pp)
Vacuum arc melting, for tool steels, June, p. 40 (.66 pp)
Heat treating, trends in design of, March, p. 53 (4 pp)

Gages
Accuracy and control of, for current needs, Apr., p. 6 (1.5 pp)
Effect of new international inch on, June, p. 39 (1 p)
Systematic control of, Jan. p. 41 (4 pp)

Gears
Optical inspection system for, Jan. p. 60 (1 p)

Grinding and Finishing
Automatic, of universal crosses, Aug., p. 72 (1.5 pp)
Centerless, Norton's new machine, Aug., p. 66 (.66 p)
Electrolytic, interchangeable units for, Sept., p. 72 (.81 p)
Electrolytic, of carbide tools, at Thompson Ramo Wooldridge, Feb. p. 42 (1.39 pp)
Electrolytic, of carbide tools, at Timken Roller Bearing, Feb. p 43 (1.61 pp)
Tools, clinic for, July, p. 60 (1.83 pp)
Wheels, tests for hardness of, March, p. 63 (1.94 pp)
X-ray orientation of diamond truing tools for, Apr., p. 56 (2 pp)

Heat Treating
Controlled atmospheres, types and uses of, May, p. 40 (4 pp)
Equipment, guide to manufacturers of, June, p. 52 (2.8 pp)
Furnaces and equipment, trends in design of, March, p. 53 (4 pp)
Metallurgy of, July, p. 48 (2.75 pp)
Steel plate, with hot forming, Aug., p. 54 (3 pp)
Surface treatments, Sept., p. 56 (3 pp)

Honeycomb
Alply Sandwich, Anybody? Feb. p. 35 (1 pp)

Hydraulics
Bubbles in lines, answer to, July, p. 65 (1 p)

Inspection
Cams, semi-automatic setup for, Apr., p. 46 (.49 p)
Gears, optical system for, Jan. p. 60 (1 p)

Lubricants
Choice of, for carbides, June, p. 62 (1 p)

Machine Tools
European production of, Jan. p. 7 (1¾ pp)
Grinder, non-vibrating foundation for, Jan. p. 45 (2½ pp)
Historical, Aug., p. 64 (1.5 pp)
Standards, building blocks, industry agrees on, July, p. 35 (13 pp)

Machining
Double-end, retooling speeds, Aug., p. 41 (2 pp)
Drilling, new production techniques, Feb. p. 55 (4 pp)
Electronic tracer drive, for, Feb. p. 51 (2 pp)
Finish milling, causes of hard spots in, March, p. 57 (3 pp)
Tape-controlled, with automatic tool changer, March, p. 50 (1 p)
Throw-away tools, with, Aug., p. 60 (2 pp)

Management
Depreciation, an element in investment decision, Feb. p. 11 (2.5 pp)
Executive development prerequisites, March, p. 6 (1.25 pp)
Labor, productivity, and competition, May, p. 20 (2 pp)

Materials
Alply Sandwich, Anybody? Feb. p. 35 (1 p)
Malleable iron, advantages of, for castings, Apr., p. 44 (2.51 pp)

Milling
Climb vs conventional, Apr., p. 39 (1.39 pp)
Finish, hard spots, causes of, March, p. 57 (3 pp)

Parts Feeding
Automatic, for switch assembly, March, p. 47 (3 pp)

Patents
Determination of "inventorship," June, p. 57 (1 p)
Engineers and patent suits, Sept., p. 76 (1.3 pp)
Importance of keeping records of inventions, Apr. p. 51 (1.66 pp)
Inventions, problems in exploiting, Aug., p. 47 (1.66 pp)
Patent talk vs English language, March, p. 51 (1.4 pp)

Personnel
No more goldbrickers, Jan. p. 37 (1 p)

Plants
Allen Mfg. Co., tour of, Feb. p. 122 (1 pp)
Gisholt Machine Co., Plastics Dept., tour of, June, p. 56 (1 p)

Plastics
Fiberglass reinforced, production of, June, p. 56 (1 p)
Gun drilling of, Sept., p. 66 (2.49 pp)
Tooling, report on current uses, Jan. p. 48 (2 pp)

Pressworking
Blanking presses, high-speed, March, p. 52 (.6 p)
Laminations for pole pieces, of, June, p. 59 (2 pp)
Mechanized, of stainless steel trim, Feb. p. 49 (2 pp)
"Shimmy" dies for trimming, case history, June, p. 45 (2 pp)

Quality Control
Aircraft production techniques for, May, p. 37 (2.65 pp)
Dimensional, gaging and measuring for, Apr., p. 6 (1.5 pp)
Parts qualification programs, Sept., p. 8 (.9 p)
Program for, at Cleveland Graphite Bronze, May, p. 44 (5 pp)
Quality Pre-Control and projectors, Aug., p. 62 (2 pp)
Small lot production, program for, May, p. 49 (1.5 pp)
Statistical basis of attribute sampling, May, p. 56 (3 pp)
Systematic gage control for, Jan. p. 41 (4 pp)
Teamwork needed for, May, p. 35 (2 pp)

Reliability
Engineering, today and tomorrow, Aug., p. 37 (4 pp)
Parts qualification programs, Sept., p. 8 (.9 p)
Vacuum valve offers, Aug., p. 51 (2 pp)

Sawing
Power, simple fixturing for, Apr., p. 41 (2.66 pp)

Spindles
Carbide, construction of, Feb. p. 124 (1.6 pp)

Standards
Building Block, industry agrees on, July, p. 35 (13 pp)

Surfaces
Machined, hard spots in, causes of, March, p. 57 (3 pp)

Swaging
Valve housing tubing, application of, Jan. p. 50 (1 p)

Systems
Gage control for quality control, Jan., p. 41 (4 pp)
Tool traffic, better communication speed, Aug., p. 43 (3 pp)

Tape Control
Automatic welding by, Jan. p. 54 (1 p)
Machine tool, computer-less equipment for, Apr., p. 48 (1 p)
Small lot shop automation, for, Jan., p. 39 (1½ pp)

Tapping
Trouble shooter's guide for, March, p. 61 (1.7 pp)

Testing
Grinding wheel hardness, for, March, p. 63 (1.94 pp)

Tooling
Aluminum, its place in Industry, June, p. 58 (1 p)
Plastic, report on current uses for, Jan. p. 48 (2 pp)

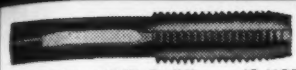
Training
Executive, prerequisites for development of, March, p. 6 (1.25 pp)

Turning
Gage for lathe work, May, p. 50 (.5 pp)
Micrometer controlled lathe center, Apr., p. 60 (1.54 pp)

Welding
Automatic, by tape control, Jan. p. 54 (1 p)
Automatic, fixturing for, March, p. 60 (.8 pp)
Semi-automatic, pole pieces redesigned for, June, p. 59 (2 pp)

Wheels
Grinding, tests for hardness of, March, p. 63 (1.94 pp)

SAVE THIS AD FOR FUTURE REQUIREMENTS—DEALER INQUIRIES INVITED



NEW SIZES ADDED DAILY . . . IF NOT LISTED HEREIN — INQUIRE

WHY WAIT

DELIVERY FROM STOCK

SPECIAL Right & Left Hand High Speed Taps-Dies & Thread Plug Gages

SIZE	THREADS PER INCH
0000	160
000	120
00	90-96-112
0	56-64-72-76-80-90
1	48-56-60-64-80-90
2	48-52-54-56-60-72-80
3	36-40-60-64-72-80
4	30-32-38-42-44-56-60-64-72-80-90
5	22-27-30-32-36-38-42-48-50-56-60-64-72-80
6	24-28-30-36-38-42-44-48-56-60-64-72-80
7	28-30-32-34-36-38-40-48-64
8	24-26-28-30-38-40-44-48-56-60-64-72-80
9	24-28-30-32-36-40
10	18-20-22-26-28-30-36-40-48-56-60-64-72-80
11	20-22-24-28-30-32-36
12	20-22-26-27-30-32-36-38-40-48-56-60-64-72-80
13	20-22-24-28-32
14	14-16-18-26-28-30-32-36-40
15	18-20-24-28-32
16	16-18-20-22-24-28-32-36
17	16-20
18	16-18-20-24-32-40
19	18-20
20	14-16-18-20-24-32
22	16-18-20-24
24	14-16-18-22-24
26	14-16-20-24
28	14-16-20
30	14-16-20
1/16	56-60-64-72
5/64	56-60-64-72
3/32	32-36-38-48-50-56-60-64
.107	52
7/64	36-40-42-44-48-50-56
1/8	30-32-36-38-40-48-56-60-80
.132	50
9/64	30-32-38-40
.148	38
5/32	24-26-28-30-32-36-38-40-50
11/64	24-26-30-32-36-38-40
3/16	12-18-20-22-24-26-27-28-30-32-36-40-48-56-64-72
.198	24

SIZE	THREADS PER INCH
13/64	24-28-30-32-36-40
7/32	20-22-24-26-27-28-30-32-36-38-40
.227	24
15/64	20-22-24-28-36-40
1/4	10-12-14-16-18-22-23-24-25-26-27-30-32-36-38-40-48-50-56-60-64-72-80
17/64	12-18-20-24-27-28-32
.277	40
9/32	16-18-20-24-26-27-28-32-36-40-46
19/64	18-24
.300	28
5/16	12-14-16-20-22-26-27-28-30-32-36-40-48-50-56-64
21/64	16-18-20-24-36
11/32	16-18-20-22-24-26-27-28-32-36-40
23/64	16-24
.365	28
3/8	12-14-18-20-22-26-27-28-30-32-36-40-44-48-56-64
25/64	14-16-18-20-24-27
.402	24
13/32	12-14-16-18-20-24-27-32-40
27/64	14-20-24-28-32-36
7/16	10-12-16-18-22-24-26-27-28-30-32-36-40-48-56
29/64	12-14-16-20
15/32	12-14-20-24-27-28-32-36-40
1/2	10-11-12-14-16-18-22-24-26-27-28-30-32-36-40-44-48-56
33/64	12-13-20-24
17/32	10-12-13-14-16-18-20-24-27-28-32-40
.550	24
9/16	10-13-14-16-20-24-26-27-28-30-32-36-40-48
37/64	10-12-18-20-27
19/32	12-18-20-24-28-32-36-40
5/8	9-10-12-13-14-16-20-24-26-27-28-30-32-36-40-56

SIZE	THREADS PER INCH
41/64	11-18-24
21/32	10-11-18-20-24-27-32-40
11/16	10-11-12-14-16-18-20-22-24-27-28-30-32-36-40
23/32	11-12-16-18-20-27-32-36-40
47/64	10-12-16-18-20
3/4	8-9-11-12-14-15-18-20-22-24-26-27-28-32-36-40
49/64	10-16-18-20
25/32	10-12-16-18-20-24-27-32-40
.800	16
13/16	8-10-12-14-16-18-20-24-27-28-32-40
.835	16
55/64	6-12
27/32	9-10-18-20-24-27-32-40-48
.850	14
7/8	8-10-11-12-13-16-18-20-24-26-27-28-32-36-40
29/32	9-12-14-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-27-28-32-40
31/32	9-12-16-18-20-24-28-32
1	5-9-10-11-12-16-18-20-24-26-27-28-30-32-36-40-48
1-1/32	8-12-14-16-18-20
1-3/64	12-14-16-18-20
1-1/16	8-10-12-14-16-17-18-20-24-27-28-32-40
1-3/32	7-8-9-12-14-16-18-20-32
1-1/8	8-10-14-16-18-20-24-27-28-32-40
1-5/32	7-8-9-12-14-16-18-20-24-32
1-11/64	18
1-3/16	7-8-10-12-14-16-18-20-24-32-40
1-1/4	8-10-14-16-18-20-24-27-28-32-40
1-5/16	6-7-8-10-12-14-16-18-20-24-27-28-32-40-48
1-3/8	5-8-10-14-16-18-20-24-32-40
1-13/32	12-16-18-20
1-7/16	6-8-10-12-14-16-18-20-24-27-28-32-40

SIZE	THREADS PER INCH
1-1/2	7-8-9-10-13-14-16-18-20-24-27-28-32-40
1-17/32	7-12-18-20
1-9/16	6-8-10-12-14-16-18-20-24-32-40
1-5/8	5-5½-6-8-10-11½-12-13-14-16-18-20-24-28-32-40
1-11/16	8-10-12-14-16-18-20-24-32
1-23/32	5-8-12-16-18-20
1-3/4	5-6-8-10-12-13-14-16-18-20-24-28-32-40
1.767	18
1.7715	12
1-13/16	8-10-12-14-16-18-20-24-32
1-7/8	5-8-10-12-14-16-18-20-24-32
1-29/32	12-16-18-20-32
1-15/16	8-10-12-14-16-18-20-24-32
2	4½-6-8-10-12-14-16-18-20-24-28-32
2-1/16	8-10-12-14-16-18-20-24-32
2-1/8	4½-8-10-12-14-16-18-20
2-3/16	8-10-12-14-16-18-20-24
2-1/4	4½-8-10-12-14-16-18-20-24
2-5/16	8-10-12-14-16-18-20-24
2-3/8	4-8-10-12-14-16-18-20-32
2-7/16	8-10-12-14-16-18-20
2-1/2	4-6-8-10-12-14-16-18-20
2-9/16	8-10-12-14-16-18-20
2-5/8	4-8-10-12-14-16-20
2-11/16	8-10-12-14-16-18-20
2-3/4	4-8-10-12-14-16-18-20-32
2-7/8	4-8-10-12-14-16-18-20-24-32
2-15/16	8-10-12-14-16-18-20-32
3	3½-4-8-10-12-14-16-18-20
3-1/8	4-8-10-12-14-16-20
3-3/16	4-8-10-12-14-16-20
3-1/4	4-8-10-11-12-14-16-18-20
3-3/8	4-8-10-12-16
3-1/2	4-8-10-12-16
3-3/4	4-8-10-12-16
4	4-8-10-12-16
4-1/8	4-8-10-12-16
4-1/4	4-8-10-12-16

Many more sizes in stock up to 6" dia.

LEFT HAND N.C. (USS)—N.F. (SAE) SIZES

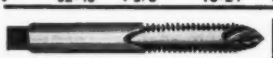
SEE ABOVE SECTION FOR MORE SIZES

SIZE	THREADS	SIZE	THREADS	SIZE	THREADS	SIZE	THREADS
0	80	8	32-36	7/16	14-20	1"	8-12-14
1	64-72	10	24-32	1/2	13-20	1-1/8	7-12
2	56-64	12	24-28	9/16	12-18	1-1/4	7-12
3	48-56	14	20-24	5/8	11-18	1-5/16	6-12
4	36-40-48	1/4	20-28	11/16	11-16	1-3/8	6-12
5	40-44	5/16	18-24	3/4	10-16	1-7/16	6-12
6	32-40	3/8	16-24	7/8	9-14	1-1/2	6-12

'OVERSIZE' and 'UNDERSIZE' TAPS

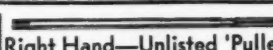
RIGHT AND LEFT HAND N.C. AND N.F. SIZES

MACHINE SCREW	#2 to #5	Plus or Minus	.003, .005, .010
MACHINE SCREW	#6 to #14	Plus or Minus	.002, .003, .005
FRACTIONAL	1/4" to 1-1/2"	Plus or Minus	.003, .005, .010 .015, 1/64, 1/32



Right & Left Hand—Unlisted 'Gun' or Spiral Pointed Taps

Size	Threads	Size	Threads
0	80 NF		
1	56 NS	7/8	9 NC, 14 NF
2	56 NC, 64 NF	1	8 NC, 12-14 NF
9/16	12 NC, 18 NF	1-1/8	7 NC, 12 NF
5/8	11 NC, 18 NF	1-1/4	7 NC, 12 NF
11/16	11 NS, 16 NS	1-3/8	6 NC, 12 NF
3/4	10 NC, 16 NF	1-1/2	6 NC, 12 NF



Right Hand—Unlisted 'Pulley' And Extra Length Taps

Size	Threads	Size	Threads
4	36-40 NC, 48 NF	3/8	24 NF
5	40 NC, 44 NF	7/16	20 NF
6	32 NC, 40 NF	1/2	20 NF
8	32 NC, 36 NF	9/16	12 NC
10	24 NC, 32 NF	9/16	18 NF
12	24 NC, 28 NF	5/8	18 NF
1/4	28 NF	3/4	16NF
5/16	24 NF	Also Larger Sizes	NC & NF

UNLISTED Right Hand "Pipe" Taps

Taper "NPT" Size	Thread	"NPT" Size	Thread	"NPS" Size	Thread	EX. LENGTHS "NPT" & "NPS" Size	Thread
1/16	27	1	8	1/16	27	1/16	27
1/4	27	1-1/4	11½	1-1/2	11½	1/8	27
2-1/2	8	1-1/2	11½	2	11½	1/4	18
3	8	2	11½	2-1/2	8	3/8	18
3-1/2	8	2-1/2	8	3	8	1/2	14
4	8	3	8	3-1/2	8	3/4	14
Also British		3-1/2	8	4	8	1	11½
		4	8	Also British		Also British	
		Also British					

Lefthand 'Pipe Taps' Taper and Straight

Size	Thread	Size	Thread
1/16	27	1	11½
1/8	27	1-1/4	11½
1/4	18	1-1/2	11½
3/8	18	2	11½
1/2	14	2-1/2	8
3/4	14	3	8
Also British		Also British	

The Largest Stock of

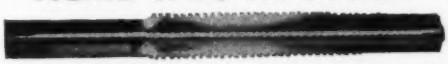
Special and Standard Taps, Dies, Plug Gages

SPECIAL RING GAGES

IF NOT IN STOCK

2 WEEKS DELIVERY

ACME TAPS IN STOCK



IF NOT IN STOCK—7 to 10 DAYS DELIVERY—When ordering or requesting quotations, kindly furnish following information:

(a) Kind of material being machined.
(b) Depth of hole, through or bottom.
(c) Tap to be used horizontally or vertically.
(d) Will tap turn, or is piece expected to be turned.
(e) Is tapping job expected to be done in one pass.
(f) Would tap be backed out of hole, or machine stopped for release of tap.
(g) If possible, submit thread length, and overall length of tap desired with blue print.

SPECIAL REAMERS

Immediate Delivery

H.S.S.S. Machine Reamers Decimal, Fractional, Letter, and Wire Gauge Sizes Prices On Application

SPECIAL—Right Hand High Speed "EXTRA LENGTH DRILLS" In Stock for Immediate Delivery

DELIVERY! QUALITY! PRICE!

You always get more for your money at . . .

CIRCLE INFORM-A-GRAM KEY NO. 149

FIELD TOOL SUPPLY CO.

Industrial Cutting Tools

31 S. DES PLAINES ST., CHICAGO 6, ILL.

All Phones: Financial 6-1195

SPEED-UP ACCURATE INSPECTION AND SORTING!

NEW RCA LIMIT-SIGNALING COMPARATOR

for both contact and air gaging

The RCA LSC Comparator speeds up accurate manual checking and sorting since the operator only has to observe the high, low, and OK limit lights. Ideal for incoming or production line inspection. Extremely reliable and accurate to .000,050".

INSTANT RESPONSE

Operates on RF frequency. No lag between contact with work and meter indication.

FAST, EASY SET-UP

Gage is linear over full scale, making it a simple matter to set up limits.

EXTREMELY VERSATILE

Can be used with standard height stand or special fixture for manual inspection, for automatic in-process, or post process inspection and segregation. Standard air-electronic adapter kit permits use for air gaging.

COMPACT

Only 8½" wide, 9¼" high, 14¼" long.

For further particulars, see your RCA Representative or write to:

RCA Tmk(s) ®

RADIO CORPORATION OF AMERICA

INDUSTRIAL AND AUTOMATION DIVISION

12601 Arnold Avenue • Detroit 39, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1501

TOMCO INC.

HAND WHEELS Straight Type Offset Type

SPECIALS

- HAND KNOBS
- MACHINE HANDLES
- HANDLES
- BALL HANDLES
- LEVERS
- SPECIALTIES

GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

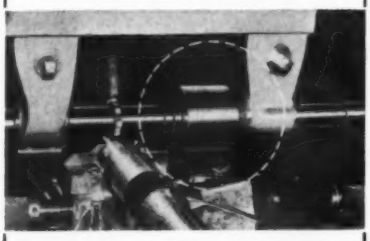
WRITE FOR INFORMATION

TOMCO INC

RACINE 2, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1502

ELIMINATE MILLING MACHINE MAINTENANCE



UPS FEEDS AND SPEEDS 200%

See how General Electric, Jeffrey Mfg., hundreds of others absolutely end arbor bushing maintenance problems and decrease production costs on horizontal milling machines by replacing the bronze outer support bushing with a Jergens "Live" Sealed Roller Bearing Unit. Jergens Units with adjustable roller bearings hold precision—permit increases in milling speeds and feeds to take full advantage of carbide cutters. The rigidity of these units increase cutter life and eliminate chatter, frozen bushings, and twisted arbors. See how hundreds save thousands! Write for FREE case histories of actual company performance reports of jobs and dollars saved.

DONLEY PRODUCTS, INC.

Dept. TP-10 11106 Avon Ave., Cleveland 5, O.

CIRCLE INFORM-A-GRAM KEY NO. 1503

ADVERTISER'S INDEX

A. I. T. Diamond Tool Company ... 127
Acme Industrial Company ... 154
Acme Tool Corporation ... 84
Acro Metal Stamping Co. ... 122
Aget Manufacturing Co. ... 127
Air-Mite Devices, Inc. ... 141
Alden Systems Co. ... 152
Alina Corporation ... 84, 134
Allegheny Ludlum Steel Corp. ... 67
Alva Allen Industries ... 137
American Brass Company ... 79
American Drill Bushing Co. ... 156
American Optical Company ... 28
American Pullmax Co., Inc. ... 133
Applied Mechanics Corp. ... 123
Armstrong-Blum Mfg. Co. ... 120
Armstrong Brothers Tool Co. ... 136
Atlas Press Company, Clausing Division ... 97

Balas Collet Mfg. Co. ... 7
Barber-Colman Company ... 106
Bausch & Lomb Optical Co. ... 83
Bellows Company ... 75
Benchmaster Mfg. Co. ... 88
E. W. Bliss Company ... 29
Branch Manufacturing Co. ... 125
Brown & Sharpe Mfg. Co. ... 85
Buck Tool Company ... 102
H. L. Bushman Co., Inc. ... 126

Cadillac Gage Company ... 14
Carr Lane Mfg. Co. ... 143
Cincinnati Shaper Co. ... 110
Robert H. Clark Co. ... 126, 130
Clausing Division, Atlas Press Company ... 97
Clearing Machine Corporation Div. of U. S. Industries, Inc. ... 37
Cleveland Crane & Engrg. Co. ... 90
Cleveland Grinding Machine Co. ... 128
Cleveland Tool & Die Co. ... 86
Cleveland Twist Drill Company ... 81
Comet Tool Company ... 133
Comtor Company ... 147
Cook's Lead Hammer Service ... 136
Cosa Corporation ... 6
Covel Manufacturing Co. ... 146
Cratex Mfg. Co. ... 141

Dayton Rogers Mfg. Co. ... 141
Delta Power Tool Div., Rockwell Mfg. Co. ... 39
Denison Engineering Div., American Brake Shoe Co. ... 16
DeVlieg Microbore Div. DeVlieg Machine Co. ... 15
Dickerman Mfg. Co. ... 117
The DoAll Company ... 82
Donley Products, Inc. ... 150
Drillmation Company ... 94
Dumore Company ... 11
Durant Tool Supply Co. ... 129
Dykem Company ... 144

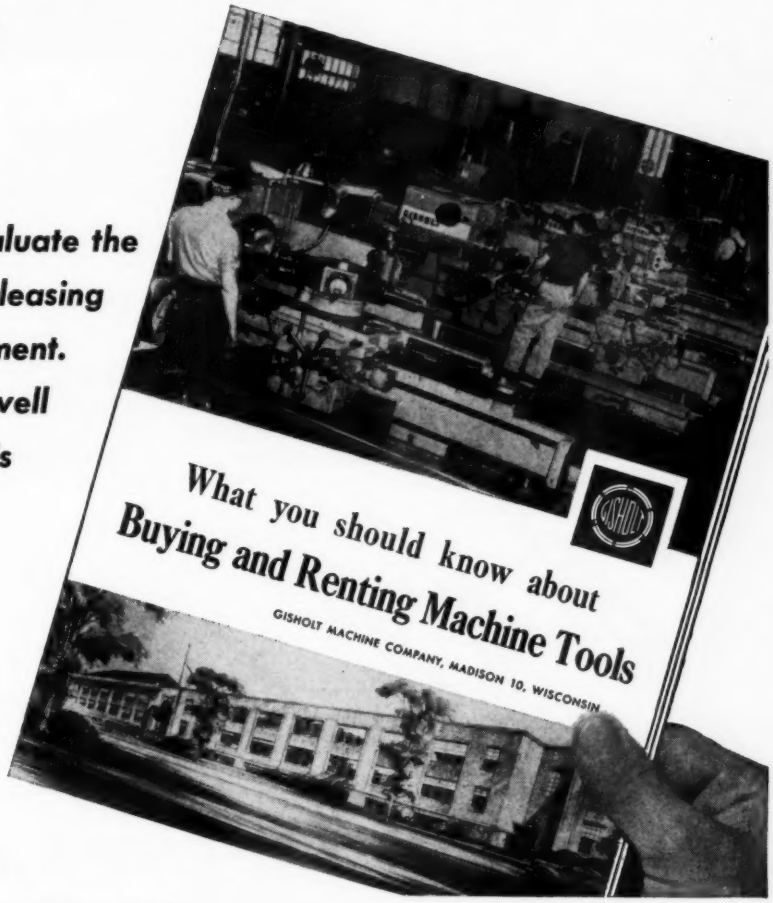
Eastern Machine Screw Corp. ... 138
Eclipse Counterbore Co. ... 98
Economy Engineering Co. ... 147
Eisler Engineering Co. ... 130
Ellison Engineering Co. ... 129
Engelhard Industries, Inc. ... 123
Erickson Tool Company ... 40

Fellows Gear Shaper Co. ... 8, 59
Fenn Manufacturing Co. ... 34
Field Tool Supply Co. ... 149
M. A. Ford Mfg. Co. ... 147
Foredom Electric Co. ... 121

Gaertner Scientific Corp. ... 80
Gage Company ... 128
Gardner-Denver Company ... 18
Gatco Rotary Bushing Co. ... 121
Gisholt Machine Co. ... 151
George Gorton Machine Co. ... 33

Can your competitors turn metal at lower costs?

***Now** is the time to re-evaluate the possibilities offered by leasing of new production equipment. Your decision today can well determine your company's position in tomorrow's competitive market.*



This free booklet tells how you can get new machines with minimum capital outlay

If you have delayed replacing old machines because of the relatively large capital investment, acquisition by methods other than outright purchase may solve your problems. Only a minimum initial investment provides you with the many competitive advantages that new machines offer, including greater accuracy, higher production rates and faster setup. New features and accessories simplify even the toughest jobs. Secondary operations are minimized and spoiled work becomes a thing of the past. All this means lower unit cost—more profit for you.

If you want the benefits that new machine tools can provide, and if you like the idea of letting them "pay their way" while they "turn" a profit for you, you'll want to write for Gisholt Bulletin 1173 on buying and renting machine tools. It fully explains one of the most liberal and comprehensive policies in the industry, and covers several types of leasing and time payment plans with vital information on depreciation, tax angles, the MAPI formula and other timely questions. The coupon will bring your free copy. Send it along today.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gisholt Machine Company
1201 E. Washington Ave.
Madison 10, Wisconsin

Without obligation, please send your Bulletin 1173.

Name.....*Title*.....

Company.....

Street address.....

City.....*Zone*.....*State*.....

Circle 151 on Readers' Service Card

For Precision and Reliability
Tumico "SUPER-SET"

UNIVERSAL PRECISION DIAL TEST INDICATOR SET

Complete Set Now Only
$21.50

For the Complete Story of this Outstanding Precision Tool — Contact any of our 3 "Coast to Coast" Locations or your nearest Local Distributor.

SCHERR-TUMICO
PRECISION MEASURING TOOLS AND INSTRUMENTS

Eastern Office: GEORGE SCHERR CO., INC. 200 Lafayette Street • New York 12, N. Y.
Midwest Office and Factory: TUBULAR MICROMETER CO. St. James, Minnesota
West Coast Office: SCHERR-TUMICO CO. 3337-39 West Olympic Blvd. • Los Angeles 19, Cal.

CIRCLE INFORM-A-GRAM KEY NO. 1521

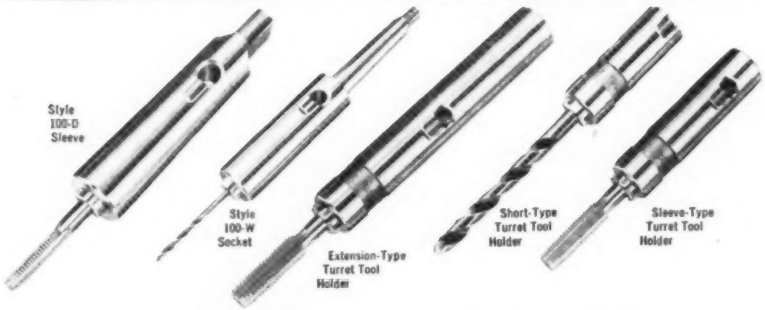
DO YOU REALLY KNOW HOW THE ALDEN SYSTEM CAN REVOLUTIONIZE YOUR PRODUCTION?

It will cut costs, increase profits and yield more production from less space . . . in your present plant. To "fuse your new plant to the future" . . . it's a MUST !

To be completely informed write for the new "ALDEN SYSTEMS HANDBOOK" . . . qualified people are invited to ask for the "ALDEN EXECUTIVE PORTFOLIO."

Alden Systems Co.
Alden Research Center
5 Washington St., Westboro, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1522



precision sleeves, sockets, holders, cut "unavoidable" accuracy loss

Why sacrifice accuracy when tooling up machine tools?

Scully-Jones precision sleeves, extension sockets, and turret tool holders are made of Stressproof steel. Hardened at wear points to maintain accuracy, resist wear, and give long, trouble-free service.

Inside and outside tapers of *sleeves* and *turret tool holders* are concentric within .002". O.D. hardening gives maximum strength—guards against nicking, a major cause of runout.

Extension sockets have hardened hole and tang-ends. Shanks and taper holes are concentric within .002".

Keyhole-type drift slots (above) accommodate "Scully-Drift" tool ejectors, permit fast tool changes, help avoid spindle damage.

Your Scully-Jones representative or distributor can tell you all about these and other *precision holding* tools.

Scully-Jones and Company
1913 South Rockwell Street, Chicago 8, Illinois

Tool Ejector

"Scully-Drift"
Twist-of-the-wrist cam action ejects tool—stops hammering and resultant damage to spindles, bearings, and tools.

SCULLY JONES **SLEEVES AND SOCKETS**

CIRCLE INFORM-A-GRAM KEY NO. 1523

ADVERTISER'S INDEX

Greenlee Bros. & Co. 13
Grip Nut Company 127

Hamilton Tool Company 103
Hardinge Brothers, Inc. 3, 99
Harig Manufacturing Corp. 96
Hause Machine, Inc. 133
Heimann Mfg. Co. 136
Heinrich Tools, Inc. 144
Hi-Shear Rivet Tool Co. 19
Horspool & Romine Mfg. Co. 128
Huebner Publications, Inc. 108, 153
K. H. Huppert Company 136
Wm. T. Hutchinson Co. 12
Hydraulic Press Mfg. Co. 23

Industrial Tectonics, Inc. 125

Jergens Tool Specialty Co. 139
Johnson Gas Appliance Co. 84
Jones & Lamson Machine Co. 104

Kaufman Manufacturing Co. 141
Kennametal, Inc. 115
Kidde Precision Tool Corp. . . . 126, 130

Lad Gage Co. 136
Lamina Dies & Tools, Inc. 92
Lapeer Manufacturing Co. 143
Latrobe Steel Co. 155
Lempco Industrial, Inc. 22
Louis Levin & Son, Inc. 122
F. J. Littell Machine Co. 135
Lodding, Inc. 139
Logan Engineering Co. 95
Logansport Machine Co., Inc. 32

Mahr Gage Co. 135
Marshall Steel Company 125
Maxwell Industries, Inc. 153
MBI Export & Import, Ltd. . . . 26, 134
Mead Specialties Company 127
Medelton Company, Inc. 154
Metal Carbides Corp. 10
W. F. Meyers Co., Inc. 125
Micrometrical Mfg. Co. 30
The Minster Machine Co. 20
Mohawk Tools, Inc. 69
Moline Tool Co. 116
Moore Special Tool Co. 25, 140

Newton Hydraulic Tooling Co. 36
Niagara Cutter Div., Bollier-Damerell, Inc. 130
Niagara Machine & Tools Works . . . 78
Nobur Manufacturing Co. 143

Ohio Knife Co. 35
O'Neil-Irwin Mfg. Co. 142
Ortman-Miller Machine Co. 71

Portage Double Quick, Inc. 118
Porter Precision Products 140
Prebco Bushing Co. 126
Producto Machine Co. 27
Punch Products Corp. 38

Radio Corporation of America Industrial & Automation Div. . . . 150
Reid Tool Supply Co. 88
Rice Pump & Machine Co. 132
Rockwell Mfg. Co., Delta Power Tool Div. 39
Rotor Tool Company 31

Sales Service Mfg. Co. 135
George Scherr Company 152
Scully-Jones & Co. 152
Seibert & Sons, Inc. 88
The Sentry Company 131
Service Machine Co. 132
Severance Tool Industries 122
Sheldon Machine Co. 119
Shore Instrument & Mfg. Co. 130
R. L. Spellman Co. 136

How-To-Do-It REFERENCE BOOKS

USE THIS AD AS YOUR ORDER BLANK

10-DAY TRIAL OFFER

HUEBNER PUBLICATIONS, INC.
1979 LEE ROAD, DEPT. D, CLEVELAND 18, OHIO

Gentlemen: Please send books checked.

V

- ☐ THE ACCURACY & GEOMETRY OF PRECISION SURFACE PLATES, ANGLES & STRAIGHT EDGES by E. W. Pennington. $ .75
- ☐ ADHESIVE BONDING OF METALS by George Epstein. 1954; 227 pages. Types and strengths of adhesives, joint factors, etc. $2.95
- ☐ BRAZING MANUAL prepared by the Committee on Brazing and Soldering, American Welding Society. 1955; 208 pages. Practical information on every type of brazing problem, including reference tables. $4.75
- ☐ COLD FORMING OF THE STAINLESS STEELS by Lester F. Spencer. A 28-page pamphlet on the subject. $1.00
- ☐ DIAMOND TECHNOLOGY by Paul Grodzinski. 784 pages. 93 working tables, and over 486 photographs and drawings. The only standard work on the subject. $10.00
- ☐ DICTIONARY OF METALLURGY by A. D. Merriman. 400 pages profusely illustrated. 7,000 definitions. 236 tables. $25.00
- ☐ DIE ESTIMATING fourth edition. Provides the KNOW-HOW for determining what it takes in units of time to build a die. 62 pages. $3.00
- ☐ DIE DESIGNING & ESTIMATING, 4th edition. 363 pages; 26 chapters; over 400 illustrations. A standard reference work. $7.50
- ☐ ELECTROPLATING ENGINEERING HANDBOOK edited by A. Kenneth Graham. 1955; 670 pages. Complete engineering fundamentals and processing data. $10.00
- ☐ ENGINEERING USES OF RUBBER edited by McPherson and Klemin. 1956; 528 pages. Written especially for engineers employing rubber in processing operations and in manufactured products. $12.50
- ☐ FASTENERS HANDBOOK by Julius Soled. 1957; 450 pages. Complete data, illustrations, and descriptions covering all currently available industrial fasteners. $12.50
- ☐ GEARS FOR SMALL MECHANISMS by W. O. Davis. 20 chapters profusely illustrated covering theory, design and practice in cutting and generating gear tooth forms. $5.00
- ☐ HANDBOOK OF BARREL FINISHING by Ralph F. Enyedy. 1955; 288 pages. Every phase of barrel finishing, including over 150 complete specification sheets. $8.25
- ☐ HANDBOOK OF LAYOUT & DIMENSIONING FOR PRODUCTION by Hyman H. Katz. 479 pages. The functional principles of dimensioning in clear, interesting, succinct English. $15.00

V

- ☐ INDUSTRY AGREES ON "BUILDING BLOCK" STANDARDS by William E. Hoffman. $1.00
- ☐ INDUCTION & DIELECTRIC HEATING by J. Wesley Cable. 1954; 590 pages. Up-to-date treatment on high frequency heating. $13.50
- ☐ INSTRUMENTS FOR MEASURE & CONTROL by Werner G. Holzbock. 1955; 416 pages. Fully describes, illustrates and compares all current devices for measuring and controlling temperature, moisture, pressure, flow, etc. $10.00
- ☐ MACHINING, HEAT TREATMENT & PICKLING OF STAINLESS by L. F. Spencer. 36 pages on the working of stainless. $1.50
- ☐ MATHEMATICAL PROGRAMMING by Reinfeld & Vogel. 274 pages. The practical application and use of mathematics in industrial programming. $8.00
- ☐ MICROSTRUCTURES OF DIAMOND SURFACES by S. Tolansky. 11 chapters of original research. New optical techniques explained. $8.50
- ☐ PLASTICS ENGINEERING HANDBOOK, edited by The Society of the Plastics Industry. 850 pages. $15.00
- ☐ PRINCIPLES & METHODS OF SHEET METAL FABRICATING by George Sachs. 1951; 537 pages. Describes in detail sheet metal forming methods, metallurgical effects in stamping, drawing, extruding, bending; design of parts and dies. $11.00
- ☐ PROTECTIVE COATINGS FOR METALS by Burns and Bradley. 2nd edition. 1955; 657 pages. Latest information on the composition, properties and performance of metallic and organic coating. $12.50
- ☐ TECHNIQUES OF PRESS-WORKING METAL by Eary & Reed. 472 pages. 20 chapters and hundreds of drawings cover this subject in highly comprehensive detail. $12.00
- ☐ THE PRINCIPLES OF INVENTORY MANAGEMENT by Nyles V. Reinfeld. An authoritative 32-page treatise on the economic aspects of analysis within your existent inventory control system. $2.00
- ☐ TREATISE ON MILLING & MILLING MACHINES by the Cincinnati Milling Machine Co. 896 pages, over 200 formulas and 700 illustrations and charts. $8.00

10-day examination allowed; returnable for full credit or refund if returned in saleable condition. TOTAL AMT. OF ORDER $_____

Open account shipments to rated companies. Otherwise payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax. Quantity prices quoted on request.

COMPANY _____

BY _____ TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Cut MACHINING COSTS With

MAXWELL CARBIDE "THROWAYS"

Adjustable BORING & REAMING Cutters

USE Carbide Inserts

Replace Tips Only!

Cutters Easily Adjustable

Index Carbide FOUR times and SAVE

Ask your Maxwell representative or write

No need to buy new holders when carbide is worn. Save time, save money with MAXWELL *adjustable* boring and reaming cutters—index carbide for FOUR cutting edges.

Maxwell adjustable cutters fit ANY standard boring or reaming bars. Cutting capacities—1⅜" to 6"; accommodate carbide tips: ⅜ x ⅞" to 1⅛ x ⅝".

A-928A

MAXWELL INDUSTRIES, Inc.

493 E. 5th St. Ashtabula, O.

CIRCLE INFORM-A-GRAM KEY NO. 1531

BE MODERN SAVE 40% CUT DIE COSTS

O-1, Oil Hardening Tool Steel

A-2, Air Hardening Tool Steel

D-2, HCHC Tool Steel

Over 300 Tool and Die Companies are saving up to 40% and more with our quality steel, plus speedy, dependable service.

Please call in your requirements or contact:

ALL ORDERS LARGE OR SMALL RECEIVE OUR CAREFUL ATTENTION

FIND OUT HOW YOU CAN CUT YOUR COSTS.

MAIL COUPON TODAY!

STANDARD STEEL & TOOL CO.
1132 W. LAKE STREET
CHICAGO 7, ILLINOIS
PHONE: MOnroe 6-1696

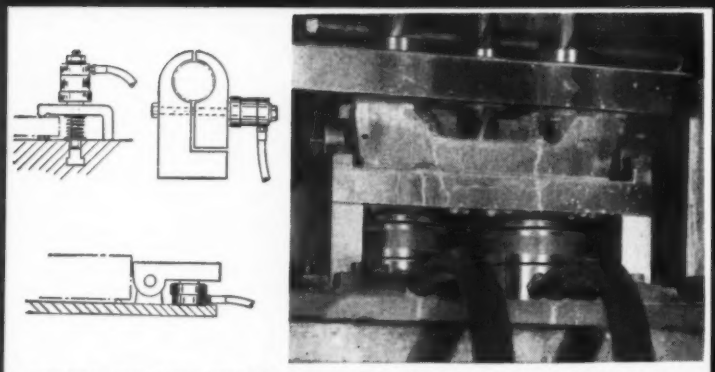
Please send list of O-1, A-2 & D-2 sizes on which we can save up to 40% or more.

CO. _____

STREET _____

CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 1532



HYDRAULIC FIXTURE LOCKING COMPONENTS BOOST MACHINE OUTPUT!

- Compact—Build into fixtures easily
- Automate your fixtures for fraction of "do-it-yourself" cost
- Ultimate speed in work loading
- Greater locking force than any other method
- A permanent investment—transfer from fixture to fixture
- Single or multiple locking heads available with matching air-hydraulic booster systems.

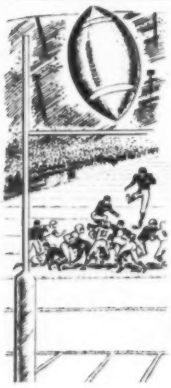
ORDER NOW FROM YOUR STOCKING INDUSTRIAL DISTRIBUTOR

Write for free full scale templates and new literature! Attach this ad to your letterhead and mail TODAY!

WILTON

WILTON TOOL MFG. CO. INC. Schiller Park, Ill.
Canadian Address: 178 Norseman St., Toronto, Ontario TP-109

CIRCLE INFORM-A-GRAM KEY NO. 1541



When ACCURACY Counts

ACME HAS SCORED FOR OVER 40 YEARS

Acme's modern plant contains over 300 metal working machines and 200 pieces of laboratory testing and inspection equipment for maintaining tolerances from .001 to .00001 inch. Being specialists in hydraulic actuating cylinders and pistons, Acme's contract, research and development work are designed to meet the Industrial Security Board's requirements.

Send your blue prints and specifications for quotation and/or further information.

ACME INDUSTRIAL CO.
214 NORTH LAFLIN CHICAGO, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1542

ADVERTISING REPRESENTATIVES

CHICAGO 1:
Robert R. Pierson,
333 N. Michigan Ave.,
FRanklin 2-4811

CLEVELAND 18:
Jerry J. Miller,
1975 Lee Road,
FAirmount 1-4040

DETROIT 2:
R. F. Pickrell & Associate
318 Stephenson Bldg.,
TRinity 1-0790

NEW YORK:
Jack Bain Co.
545 Fifth Ave.,
MUrray Hill 2-3345

NEW ENGLAND:
Meade & Co.,
454 Statler Office Building
Boston 16, Mass.,
LIberty 2-9677

WEST COAST:
M. D. Pugh & Assocs.,
Altadena, Cal.
P.O. Box 635
SYcamore 7-2894

Palo Alto, Cal.:
Hunter Vinton
16 W. Crescent Drive
DAvenport 5-4815

ADVERTISER'S INDEX

Standard Steel & Tool Co. 153
Standard Tool Co. 138
Standard Tool & Mfg. Co. 93
P. A. Sturtevant Co. 84
Superior Steel Products Corp. 24
Supreme Products Corp. 62
Syntron Company 100

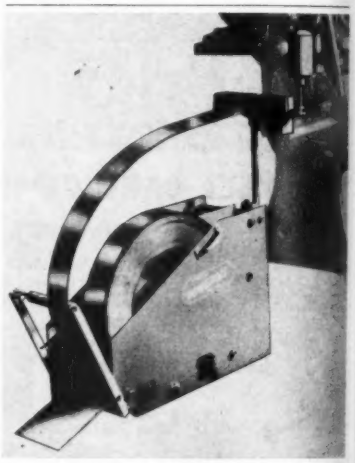
C. B. Teeter 132
Threadwell Tap & Die Co. 42
Timken Roller Bearing Co. 65
Titan Tool Supply Co. 124
Tomco, Inc. 150
Tomkins-Johnson Co. 89
Trico Fuse Mfg. Co. 124

United States Diamond Wheel Co. . . . 4
U. S. Industries, Inc.
Clearing Machine Corp., Div. 37
Unitron Instrument Div.,
United Scientific Co. 101
Universal Engineering Co. 21

Valvair Corporation 87
Vascoloy-Ramet Corp. 5
Vernon Devices, Inc. 128
Vlier Engineering Corp. 77

Walsh Press & Die Co. 61
Ward Machinery Co. 139
Wardwell Mfg. Co. 137
Warner & Swasey Company 2
Watts Brothers Tool Co. 126
Webber Gage Co. 66
S. B. Whistler & Sons, Inc. 121
Willey's Carbide Tool Co. 145
Wilton Tool Mfg. Co., Inc. 154
Woodson Tool Company 131

The Yoder Company 140



HERE'S AUTOMATION for YOUR PRESSES

Automation for your press room is easily achieved through use of a "Poweroll" Coil Cradle-"Clean-Oiler" combination, a press equipped with an automatic feed and a die having a built-in scrap chopper, to form a completely automatic high production machine. Get maximum production by using this compact cradle-oiler unit. It can easily be moved from one press to another as needed, and can be loaded without a crane. Prices start at $325.00. Capacities available to 24" width, to 54" O.D., and to 4,000 lb. weight.

WRITE for LITERATURE

THE MEDELTON CO., INC.

335 E. 142nd St., Bronx 54, N. Y.
CIRCLE INFORM-A-GRAM KEY NO. 1543

DIEMAKERS...

Cut costs here

Free-machining DESEGATIZED® HIGH ALLOY DIE STEELS

4

grades regularly stocked for long-run die applications...

- **OLYMPIC FM** (Type D-2)
  ... for typical long-run applications
- **BR-4 FM** (Type D-7)
  ... for extreme abrasive service
- **GSN FM** (Type D-3)
  ... to meet non-deforming requirements
- **COBALT CHROME FM** (Type D-5)
  ... for extra resistance to galling and pickup

Latrobe's 12% chromium die steels are easier to work, easier to machine . . . because they contain evenly-dispersed, fine alloy sulphides which permit faster speeds and feeds, and result in better machined surfaces.

As a result of Latrobe's DESEGATIZED process of manufacture, these steels are fully-uniform . . . free of harmful carbide segregations. They're tougher, respond readily to heat treatment, and possess unusual wear resistance characteristics.

For better die steels and technical service, call your Latrobe representative today!

LATROBE Metalmasters

LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

BRANCH OFFICES and WAREHOUSES:
BOSTON • BUFFALO • CHICAGO • CLEVELAND • DAYTON
HARTFORD • LOS ANGELES • MIAMI • MILWAUKEE • NEW YORK
PHILADELPHIA • PITTSBURGH • SAN LEANDRO • TOLEDO

CIRCLE INFORM-A-GRAM KEY NO. 155

HUEBNER PUBLICATIONS, INC.
1975 Lee Rd., Cleveland 18, O.

Form 3579 Requested

BUSHINGS...

on the Rocks!

It's "refreshing" to know — American provides drill jig bushings for every tooling purpose. We serve them to your "taste", to satisfy your job requirements. This is an *American* tradition.

Your local exclusive American distributor can fill your order for practically any size or type of bushing, right from his shelf. *You can depend on American* for precision drill jig bushings, engineered to fit your needs precisely.

Write for FREE Catalog. Its easy selection tables make ordering the correct bushing a snap.

American

DRILL BUSHING CO. • 5107 Pacific Blvd. • Los Angeles 58, Calif.